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ABSTRACT

The purpose of this review of selected literature is to further extend knowledge about the effects of Head Start on cognitive development. From a comprehensive collection of over 1,400 documents concerning Head Start, 71 studies were selected for review and coded to permit a meta-analytic, quantitative analysis of findings. The coding system recorded a statistical estimate of effect size, which was an outcome measure based on a comparison of the cognitive performance of two groups. The 71 studies yielded 148 comparisons and 449 effect sizes. For each effect size, the characteristics of the Head Start experience for each group investigated and the characteristics of the children in each group were coded. Additional information was also recorded on the design of the selected studies and on the measurement of the cognitive domain. After an overview of the report provided in chapter I, chapter II briefly discusses the review in terms of cognitive development and the methodological and analytical procedures employed. Chapter III (1) specifies the kinds of cognitive gains made by children participating in Head Start; (2) discusses the program in terms of duration, classroom composition, staff training, the special parent program, curriculum, and the program operator; and (3) describes demographic characteristics of children served by Head Start, with specific attention being given to maternal education, single-parent families, family size, IQ at enrollment, effects of minority participation, and age at enrollment. Related materials are appended. (RH)

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Preliminary Report

The Effects of the Head Start Program on Children's Cognitive Development

September 1983

PS 014617

HEAD START EVALUATION, SYNTHESIS
AND UTILIZATION PROJECT

Contract No. 105-81-C-026

September 1983

PRELIMINARY REPORT

THE EFFECT OF THE HEAD START PROGRAM ON CHILDREN'S COGNITIVE DEVELOPMENT

Prepared for:

Mr. Dennis Deloria
Project Officer
Office of Program Development
Administration for Children, Youth and Families
Office of Human Development Services
Department of Health and Human Services
Washington, D.C.

Author:
Adele Harrell

Project Director:
Sherrie Aitken

Senior Analysts:
Harriet Ganson
Gerald Williams

CSR, Incorporated
Washington, D.C.

This is a preliminary report. The
findings and conclusions may be updated
as further data become available.

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CHAPTER I: OVERVIEW OF REPORT

The principal objective of the Head Start program is to foster the social competence of young children. To this end program goals include facilitating the child's cognitive and socio-emotional development, promoting child health, and encouraging parental involvement in the educational process. An important component among the Head Start goals is enhancing the cognitive development of Head Start participants. By providing an intellectually stimulating program, Head Start seeks to develop the child's problem-solving ability, command of language, readiness for school and skills needed to function successfully in school and elsewhere.

The success of Head Start in accomplishing this goal has been the subject of considerable research. Earlier reviews of Head Start's effectiveness report that participation appears to produce results in several areas. As early as 1969, Grotberg (1969) concluded, on the basis of a review of the literature, that "disadvantaged children are able to develop in cognitive, intellectual and achievement behavior as a result of Head Start programs."

Subsequent reviews of the ever-expanding body of Head Start research have confirmed this assessment and described in greater detail the kinds of gains realized. The findings consistently indicate that Head Start children make gains in IQ and school readiness over the school year. In addition, gains have been found in language development, especially among bilingual children (Hubbell, 1983). On a long-term basis, evaluations of the performance of Head Start children in school reveal fewer grade retentions and fewer placements in special education or remedial classes (Mann, Harrell and Hurt, 1977).

We have also learned a good deal about the aspects of Head Start that appear to be most effective in bringing about cognitive gains. Program variables that contribute materially to improvements in the child's cognitive development include, in order of priority, parent involvement, classroom composition, staff characteristics and training, and curricular planning and implementation (Collins et al., 1982). Programs with high levels of parent involvement and those staffed by teachers trained specifically in early childhood education or child development produce greater cognitive gains than other programs.

Children also appear to learn more in smaller classes and classes with lower child/staff ratios. No one curriculum has been demonstrated to be superior for teaching cognitive skills. Indeed, it appears that any educational strategy that was based on sound educational theory and implemented by a well-qualified professional staff can be expected to produce results. Findings such as these, gleaned from reviewing the research, have been of great value to those concerned with formulating Head Start policy, setting priorities and operating programs.

The investigation of Head Start's effects is continuing as part of the Head Start Evaluation, Synthesis and Utilization Project, carried out by CSR, Incorporated, under the sponsorship of the Administration on Children, Youth and Families. The purpose of this project is to collect all existing documents related to Head Start research studies and analyze them using a variety of synthesis techniques. A series of preliminary reports, of which this is one, is being prepared while the literature collection continues. Each report uses the total amount of relevant information available at the time of preparation.

The process described above presents one potential problem in interpretation of the findings. Because the number of research studies available for each successive review will increase, the conclusions of later reports might not be entirely consistent with those from earlier reports. We intend to examine such inconsistencies carefully and present in the final report a reanalysis of all major findings based on the complete set of studies available at the end of the document collection. In the interim, figures and tables that present findings inconsistent with findings presented in earlier preliminary reports are noted for the reader.

The purpose of this report is to further extend our knowledge about the effect of Head Start on cognitive development. To evaluate the range of cognitive effects, we investigated the magnitude of the gains made by Head Start participants in the areas of IQ, school readiness, school achievement and other aspects of school performance. We also investigated the characteristics of the programs most effective in producing gains and the characteristics of the children making these gains.

This report goes beyond earlier reviews of the research literature in two ways. First, this report is based on an exhaustive search for research on the topic. The search strategy, described later in the paper, produced over 1,400 documents on Head Start, including government-funded studies, books, dissertations, and journal articles. This body of literature, the most comprehensive collection of Head Start research to date, provides a wealth of information on the impact of Head Start on cognitive development.

Second, this review uses meta-analysis, a powerful new technique for combining research findings. Meta-analysis, developed over the last five years, permits the systematic synthesis of findings from studies which differ in design and methodology. By converting the statistics from each study to a common metric, in this case a standard (z) score, we can compare the magnitude of cognitive gains reported by many investigators. Furthermore, by comparing the characteristics of the Head Start programs and children in the studies, we can describe quantitatively the link between these characteristics and gains in IQ, school readiness, and achievement.

To permit a quantitative comparison of findings across studies, we have examined only research findings reported in the form of statistical estimates of the impact of Head Start participation on cognitive development. Qualitative studies are excluded as are those limited to the study of other Head Start outcomes such as child health. Because our goal is to develop information on the "typical" Head Start experience, no studies of Federally funded Head Start demonstration programs, or equivalent programs, or summer-only Head Start programs are included. Findings are included only if they (1) compare Head Start children before and after participation, (2) compare Head Start children to similarly disadvantaged children not in any preschool program, or (3) compare children in a Head Start program with an experimental component to those in regular Head Start. This excludes studies which compare Head Start children to those in other preschool programs and studies that compare Head Start children to more advantaged children.

The results indicate that Head Start does, indeed, enhance the cognitive development of children.

The most significant findings are:

- Children make immediate gains in basic cognitive competency, school readiness and achievement;

- Gains in basic cognitive competency, school readiness and achievement are sustained, at a lower level, during the first three years after Head Start.

- The Head Start program has become more effective in promoting cognitive development. Gains made by children who attended Head Start since 1970 are considerably larger than those made by children in Head Start from 1965 to 1969.

- The most disadvantaged children--those from single-parent families and/or families in which the mother had a tenth grade education or less--gained the most from their Head Start participation.

More tentatively, the findings suggest that:

- Children in Head Start for ten months or longer gained more than those attending for a shorter time. Similarly, children in programs lasting a full school year or longer (8 months or more) gained more than those attending shorter programs. There is some evidence that programs lasting four or more hours per day produce larger gains than shorter programs.

- Classroom composition may be a factor in cognitive development. Classes with 90 to 100 percent minority children gain less than ethnically mixed classes.

- Variations in study design--in particular in the type of comparisons used, the sample size, and study date--may affect the size of the gain reported.

Perhaps equally important was what we did not find:

- Data limitations made an analysis of long-term gains impossible.

- Child/staff ratio and staff training did not emerge as factors in the magnitude of cognitive gains. Problems with missing data and aggregate categories may be masking the effects of these aspects of Head Start.

CHAPTER II: THE REVIEW OF RESEARCH ON THE EFFECT OF HEAD START ON COGNITIVE DEVELOPMENT

The objective of this report is to provide a systematic summary of the effects of Head Start on cognitive development. This summary is based on the integration and analysis of the findings of the large body of research undertaken since the inception of the program. These findings represent repeated observations of the effects of Head Start and, taken as a group, represent a solid base of empirical evidence with which to explore this issue.

A series of questions about the impact of Head Start guided the analyses:

- Does Head Start have an effect on cognitive development upon completion of the program and during the early school years?

  Based on the findings of earlier reviews, we expect to find that Head Start has a positive effect on the cognitive development of participants measured at or near the end of the program. Our analysis examines in some detail the kinds of cognitive skills acquired and the magnitude of the gains.

- Does Head Start have lasting effects on cognitive development, effects that can be observed into the middle school years and beyond?

  At the heart of the philosophy of compensatory education is the assumption that early education intervention can be used to correct early environmental disadvantages and provide the skills needed for later educational success. However, measuring the long-term effects of Head Start on cognitive development has proven exceedingly difficult. Intervening educational experiences as well as the problems associated with valid measurement of the kinds of cognitive skills acquired through Head Start have confounded the results. Nonetheless, we evaluated what has been learned about the performance of Head Start children up to three years after the program and tried to look beyond.

- What are the characteristics of Head Start programs that have an effect on cognitive development?

  Head Start programs vary widely in organization, content, duration, educational curriculum and staffing. Much of this variation has resulted from efforts to evaluate the effectiveness of alternative approaches or to accommodate the interests and needs of parents and local program planners. This variation permits us to look at the selected program characteristics on cognitive gains and to identify the kinds of programs that "work."

- What kinds of children appear to make the greatest cognitive gains in Head Start?

  The effectiveness of Head Start in bringing about cognitive gains may depend in part on the relative advantages or disadvantages of the children. For example, children with low IQ scores and socio-economically disadvantaged families may have the greatest need for a special intervention program like Head Start and the most to gain in cognitive performance. This analysis investigates the relationship of these factors to cognitive gains in Head Start.

COGNITIVE DEVELOPMENT

Cognitive development, in the broadest sense, includes the full range of intellectual abilities that enable a child to form concepts, communicate with others and solve problems. It consists of an interlocking set of competencies which may develop at varying rates. In addressing the broad issue of effects on cognitive development, we selected several areas of skill development believed to be related to the successful functioning of the child. These include basic cognitive competence, readiness for school, and achievement. These domains of cognitive development are described below. In addition, we examine the effects of Head Start on other areas related to cognitive development such as concept formation, the rate of grade failure, and the rate of placement in remedial classes.

Basic cognitive competence refers to the ability to process information. It includes problem solving ability, reasoning, mastery of concepts and critical thinking. In the Head Start research included in this review, the large majority of the research on basic cognitive competence reviewed used one of the standardized IQ tests such as the Stanford-Binet Intelligence Scale, the Peabody Picture Vocabulary Test, and the Weschsler Preschool and Primary Scale of Intelligence. This reliance on standardized tests has led some reviewers to question the validity of the short-term cognitive gains reported by many researchers. As White noted:

> Most evaluations of preschool projects find an immediate increase in IQ scores. The reason for this immediate increase is not clear. It could reflect a genuine intellectual progress or it could reflect a familiarity with the situation, greater self confidence, and an increased willingness to attempt problem solving in the test-taking context (Hertz, 1983).

Thus, reports of gains in basic cognitive competence must be interpreted cautiously.

Readiness for school refers to learning a combination of essential developmentally appropriate skills and patterns of behavior. These skills include gross and fine motor control, knowledge of appropriate classroom prewriting skills, command of a basic vocabulary, comprehension and expressive communication, perceptual discrimination, and an understanding of mathematical concepts (Collins et al., 1982). Gains in readiness are particularly important in helping the child make a successful transition into the classroom experience and curriculum. Many investigators have examined the readiness of Head Start children to enter school upon completion of the program. Measures of school readiness used most often in the literature reviewed were the Caldwell Preschool Inventory and the Metropolitan Readiness Test.

Achievement refers to mastery of the classroom subject matter. Intellectual growth and development is a cumulative process beginning in infancy and continuing throughout the life cycle. What happens at each stage is a function, in part, of the prior stage. The early gains made in Head Start in basic cognitive skills and school readiness may affect later achievement in school. Although some achievement tests focus on specific subject areas such as mathematics, language or reading, the majority of those reviewed used general achievement tests, most often the Metropolitan Achievement Test and the Wide Range Achievement Test.

METHODOLOGY

The meta-analysis method of integrating research findings shares with the more traditional methods of literature review the requirement that the universe of relevant documents be identified. At the time this quantitative synthesis was conducted, a comprehensive literature search by CSR had located over 1,400 documents with data pertaining to Head Start. These documents include monographs, dissertations, journal articles, books and unpublished papers dating from the 1965 inception of the Head Start program to the present time. While it is difficult to identify every single research report, we believe this collection is representative of the Head Start research literature.

Identifying the Universe of Head Start Studies

The process of identifying the universe of studies began with the bibliography assembled in the 1975 Head Start literature review conducted by The George Washington University's Social Research Group. This bibliography included approximately 700 references. The materials collected during this study and additional materials held by ACYF were loaned to CSR. An additional 700 plus references were identified through on-line searches of computerized data banks and through manual searches of selected libraries. A list of sources is provided in Appendix B.

As Head Start resources were collected, the bibliographies included in these works were reviewed for additional references. In addition, 2,000 Head Start grantees were contacted by letter to request information on reports, papers, and other publications which included Head Start evaluation data. This effort resulted in the location of otherwise fugitive materials. Government personnel and researchers active in Head Start were contacted in an effort to obtain the most current results. Every document in the collection was abstracted and then indexed by topic area to assist in the retrieval of information. A list of the 26 key words, and their definitions, used to index the documents is provided in Appendix C.

Selecting Studies for Review

The subset of studies to be included in the meta-analysis was selected from the complete collection by a sequential sorting process. At each step in this process, projects that failed to meet specified criteria were eliminated from the set of eligible studies. All research reports coded with the keywords "cognitive development in general" or to cognitive development in the areas of "IQ," "language" and "reading" were identified by computer. Keyword coding was deliberately broad to avoid omitting relevant documents. All documents reporting findings on the same groups of children were considered part of the same study and treated as a single unit to avoid duplicate coding of findings.

Study abstracts and, when necessary, study documents were reviewed in order to eliminate:

1) Studies that did not provide findings on the effect of Head Start on cognitive development. This step eliminated studies of cognitive development not related to Head Start participation and studies of other Head Start outcomes.

2) Studies that looked only at summer Head Start. As noted before, summer Head Start is being eliminated as a program option and the purpose of this review is to learn more about the effect of current Head Start programs.

3) Studies of special Head Start programs including Basic Education Skills, Child and Family Resource Program, Child and Family Mental Health Program, Parent and Child Centers, and Parent and Child Development Centers. These studies do not investigate the effects of regular Head Start.

4) Studies of related programs such as Home Start and Follow Through that did not include separate data for participants in regular Head Start.

5) Studies not reporting primary data. Bibliographies, literature reviews, or other secondary reports were eliminated. New analyses of existing data (secondary analyses) were not eliminated.

6) Studies not including statistics that compare (a) Head Start children before and after participation in the program, (b) Head Start children and comparable children not enrolled in a preschool program, or (c) children in an experimental Head Start program and children in regular Head Start.

The screening process resulted in the selection of 71 studies. These studies represent the population of research with data appropriate for this review.

Coding the Studies

The 71 studies selected for review were coded to permit a quantitative analysis of the findings. All documents associated with each study were treated as a single unit to prevent any duplication. A list of the studies is provided in Appendix E.

The coding system shown in Appendix D was used to record a statistical estimate of the magnitude of Head Start's impact on cognitive development--the effect size. The effect size is an outcome measure based on a comparison of the cognitive performance of two groups. Within any one study, there may be a number of two-group comparisons. For any one comparison, there may be a number of effect sizes based on different measures of cognitive development or cognitive development measured at different times. For this analysis, the 71 studies yielded 148 comparisons and 449 effect sizes. Over one-third of the studies yielded one or two effect sizes, while eleven studies produced more than ten effect sizes each. Exhibit 1 illustrates the number of effect sizes per study.

For each effect size, the characteristics of the Head Start experience of each group and the characteristics of the children in each group were coded. Additional information on the study design and on the measurement of the cognitive domain was also recorded. A description of the kinds of information collected is provided in the sections that follow.

Careful attention was directed at the design and implementation of the coding system. Procedures were subjected to extensive pretesting to determine the clarity of items and directions and the feasibility of alternate forms. Drs. Jack Hunter, Gregg Jackson, Herbert Walberg and Karl White provided advice and consultation in this process. After the materials were developed, extensive training sessions were conducted to teach the coders the procedures and definitions required. Training sessions consisted of discussions of problem areas and duplicate coding of studies. Coders worked in teams to code their first several documents to insure accuracy.[1]

Effect Sizes. The unit of analysis in meta-analysis is the effect size--a statistic that compares the performance of two groups. In this analysis, standard scores (z scores) are used. The meaning of an effect size can be understood most easily through a brief example. In a comparison of IQ scores, between a group of children who have attended Head Start (treatment group) and a group of children who have not received preschool training (no treatment group), an effect size provides a standardized measure of the difference between the treatment and no treatment groups. If the effect size were 0.36, it would mean that the average child in the treatment group was 0.36 of a standard deviation above the mean for the average child in the no treatment group. An effect size of zero means that there is no difference between the groups. All the effect sizes in this study have been constructed so that a positive effect size implies that Head Start has had a positive effect (e.g., the Head Start group mean is greater than the no treatment group mean).

---

[1] Those interested in the codes by study may contact the ACYF Project Officer, Dennis Deloria.

Exhibit 1

THE NUMBER OF EFFECT SIZES PER STUDY

Number of Effect Sizes Per Study	Number of Studies	Total Number of Effect Sizes
1	15	15
2	20	40
3	2	6
4	7	28
5	4	20
6	4	24
7	2	14
8	4	32
9	0	
10	2	20
11	0	
12	2	24
--		
15	1	15
--		
19	1	19
--		
24	2	48
25	2	50
--		
28	1	28
30	1	30
--		
36	1	36

The general formula used for calculating effect sizes was:

$$\frac{\bar{X}_T - \bar{X}_{NT}}{SD_{NT}}$$

Where: $\bar{X}_T$ is the mean score for the treatment (Head Start) group, or for a single group design posttest score;

$\bar{X}_{NT}$ is the mean score for the no treatment group or for a single group design pretest score; and

SD_{NT} is the standard deviation of the no treatment group.

This formula was adapted as needed to permit effect size calculations from a variety of statistics reported in the literature. The formulae for more complex computations of effect sizes can be found in McGaw and White: Meta-analysis of empirical research. Paper presented at the American Educational Research Association Research Training Seminar, New York, 1981. The formulae used for calculating the majority of the effect sizes in this review are shown in the coding manual in Appendix C. Dr. Karl White served as the statistical consultant during the coding.

Program Characteristics. In addition to calculating all effect sizes for each comparison group in a study, we recorded for each comparison information about the characteristics of the children and their families, the characteristics of the Head Start program and the characteristics of the study design and methodology. This information permits us to examine the effect on cognitive outcomes.

Program characteristics selected for coding included:

- program model (e.g., whether the Head Start program was home based or center based);
- program focus (e.g., Standard Head Start or Planned Variation);
- program curriculum;

- program staffing (e.g., child/staff ratio, class size, number of staff with degrees);
- program location and organization (e.g., urban versus rural, public school versus private school);
- parent treatment (e.g., whether or not there was a special parent treatment component);
- specialized services (e.g., health services, staff training);
- program cost per child;
- program duration (e.g., hours per day, days per week, months per year).

Child Characteristics. There are a number of characteristics of the children and their families which may have an effect on the magnitude of Head Start impacts. Wherever possible, we recorded detailed information about the group of children or families included in the studies. The characteristics selected for coding were:

- child demographics (i.e., average age and IQ, percent minority);
- family composition (i.e., average family size, average number of children, percent single or two-parent);
- family socioeconomic status;
- family employment (i.e., percent of children with one or two parents working).

It should be noted that a great many studies do not provide information on some or many of the items listed above. However, we decided to try to obtain even difficult items like program cost (reported by only three studies) since the implications for policy decisions are strong and the need for empirical evidence great.

Study Characteristics. Our goal in this study was to conduct a comprehensive review of the literature. Therefore, we have included all studies which have usable information on the impact of Head Start on cognitive development. Because we have used all available research, our data have come from studies of varying quality and design. For example, some studies use randomly assigned treatment and control groups while others simply test children who happen to be in a Head Start program. This presents the obvious problem that the findings may be biased by the inclusion of studies with weak designs; that is, well-designed studies may yield different results from other studies.

We considered two approaches to controlling for the quality of the research reviewed for this analysis. One approach is to assess the quality of each study and then to delete all of those which fall below a certain minimum standard. The other approach, and the one selected for this review, is to rate the quality of each study on several factors and then to determine whether the quality of the research is related statistically to the findings on the effects of Head Start on cognitive development.

We evaluated each study on the following factors:

1) Sampling (e.g., statistical versus convenience sample, size of sample);

2) Comparison Group (e.g., number of comparisons and pre/post versus Head Start/no treatment groups);

3) Statistics and measures (e.g., written or oral test, who administered test, data reported in what form, size of effect); and

4) Index of validity (i.e., each study was scored on a scale which ranged from well-executed designs to quasi-experimental or pre/post designs with major problems).

ANALYSIS

Using each of the effect sizes as a measure of the impact of Head Start on cognitive development, we examined the average gains reported by 71 studies of Head Start children. The results, presented in the next chapter, indicate the kind and amount of cognitive gains reported in the literature. By relating these outcomes to the characteristics of the Head Start programs and participants, the analysis identifies "what works" and for whom. To test the robustness of these conclusions, we compared the average effect sizes for studies that differ in design, methodology and time.

In conducting the analysis we were faced with the problem that some kinds of information, e.g., the age of the children, was available for almost all comparison groups and effect sizes, while other information, e.g., program cost, was rarely available. To maximize the amount of data available, we based our findings on each issue on the total set of effect sizes with information on the items related to the issue. For this reason, the number of effect sizes and studies represented in various findings varies widely. We have attempted to point out instances in which the limited amount of information warrants a certain caution on the part of the reader.

Exhibit 2 illustrates, for key items, the number of effect sizes available and the number of studies on which they are based. As this chart reveals, not all these items could be included in the analysis. Several items were dropped from the analysis due to the problem of missing data. Others were dropped because of lack of variation; that is, because all the effect sizes share the same characteristics.

For the analysis, it was often necessary or desirable to construct variables by grouping the coded categories. Whenever possible, the variable categories were designed to address current policy issues or to reflect theoretical concepts from the child development literature. Frequently, however, decisions on the grouping of categories were based on the availability of data and its distribution. Explanations for the classifications selected are provided with the findings.

Exhibit 2

THE NUMBER OF EFFECT SIZES AND STUDIES PROVIDING DATA ON THE CHARACTERISTICS OF HEAD START PROGRAMS, HEAD START CHILDREN, AND HEAD START STUDIES

	Effect Sizes	Studies
PROGRAM CHARACTERISTICS		
Organization		
Public School	181	28
Community Action Agency	65	8
Other	25	6
Multiple	136	18
Treatment		
Child only	394	65
Child/parent separate	51	6
Child/parent together	4	2
Nonstandard Head Start		
Variations-center attendance	0	0
Home-based	0	0
Locally designed	7	1
Planned Variation	20	3
Community		
Urban/suburban	246	45
Rural	57	5
Combined	129	17
Center/Home Based		
Center	442	69
Home	0	0
Both	5	2
Curriculum		
Traditional	41	12
Behavioristic	0	0
Cognitive	48	4
Humanistic	0	0
General experimental	40	2
Multiple	44	9
Other	19	7

Exhibit 2 (Continued)

THE NUMBER OF EFFECT SIZES AND STUDIES PROVIDING DATA ON THE CHARACTERISTICS OF HEAD START PROGRAMS, HEAD START CHILDREN, AND HEAD START STUDIES

	Effect Sizes	Studies
PROGRAM CHARACTERISTICS		
Hours Per Day		
0 - 4	86	16
more than 4	96	11
Days Per Week		
1 - 3	0	0
4	11	2
5	253	33
Months Per Year		
Up through 8	63	6
More than 8	287	48
Number of Years		
1 or fewer	260	34
More than 1	24	4
Children Per Class		
13 - 15	62	6
16 - 18	67	14
19 or more	56	9
Teachers Per Class		
One	67	11
Two	28	4
Child/Staff Ratio		
10 to 1 or lower	65	11
More than 10 to 1	32	4
Cost Per Child		
$1,500 or less	8	1
More than $1,500	5	2
Special Service Components		
Health Services		
Yes	14	2
No	31	8
Staff Training		
Yes	26	5
No	12	5

Exhibit 2 (Continued)

THE NUMBER OF EFFECT SIZES AND STUDIES PROVIDING DATA ON THE CHARACTERISTICS OF HEAD START PROGRAMS, HEAD START CHILDREN, AND HEAD START STUDIES

	Effect Sizes	Studies
PROGRAM CHARACTERISTICS		
Parent Program		
Yes	44	3
No	37	9
CHILD CHARACTERISTICS		
Age at Start		
Up to 4	28	5
4.1 to 4.5	168	28
4.6 to 5.0	106	10
5.1 or more	59	12
SES		
Low	427	67
Other	0	0
IQ at Start		
Low	53	7
Low Average	151	28
Average	99	17
Average Maternal Education		
10th grade or less	46	6
11th grade or more	56	8
Percent in Single-Parent Families		
0 - 40%	38	7
41 - 60%	16	5
61 - 100%	24	3
Average Number of Persons in Family		
5	24	4
6	48	7
7	22	2
8	12	1
Percent Male		
0%	12	5
1 - 39%	0	0
40 - 49%	84	12
50 - 61%	137	24
62 - 99%	0	0
100%	12	5

Exhibit 2 (Continued)

THE NUMBER OF EFFECT SIZES AND STUDIES PROVIDING DATA ON THE CHARACTERISTICS OF HEAD START PROGRAMS, HEAD START CHILDREN, AND HEAD START STUDIES

	Effect Sizes	Studies
CHILD CHARACTERISTICS		
Percent One Parent Employed		
0 - 50%	0	0
51 - 100%	40	2
Percent Two Parents Employed		
0 - 50%	0	0
51 - 100%	4	1
Percent Minority		
0 - 24%	6	4
25 - 89%	46	19
90 - 100%	87	19
STUDY DESIGN		
Type of Comparison		
Pre/Post	211	49
HS vs. No treatment	196	33
Exper. HS vs. Regular HS	42	5
Assignment to Group		
Random	70	6
Matched	69	14
Convenience	191	22
Sample Selection		
Statistical	44	8
Convenience	405	64
Sample Frame		
Single site	371	59
National	74	10
Other	4	2
Index of Validity		
Lowest	30	10
Lower	224	41
Average	174	24
Higher	20	4
Highest	0	0

CHAPTER III: COGNITIVE GAINS IN HEAD START

INTRODUCTION

Head Start is designed to foster the overall competence of children. Program goals include facilitating the child's cognitive and socio-emotional development, promoting child health, and encouraging parent involvement in the educational process. From this array of objectives, one--cognitive development--has been selected for study in the report. The other objectives will be studied in related reports from the project.

Cognitive development refers to the set of intellectual abilities that enable children to form concepts, communicate well, and solve problems. The areas of cognitive development reviewed in this study are described in the preceding chapter. They include basic cognitive competency, school readiness, achievement and outcomes such as the rate of grade advancement in school. These abilities can make a major contribution to the overall social competence of Head Start children and to their successful functioning in school and elsewhere.

In addition to describing the kinds of cognitive gains made by Head Start children, this analysis investigates factors that could influence cognitive outcomes. Of particular interest is the relationship between program characteristics such as class size, program duration and staffing and the tendency of children to gain on cognitive measures. Similarly, child characteristics such as age, IQ, or family background may influence Head Start's effect. The findings are presented in this chapter.

One problem associated with pooling the results of a collection of research projects is that differences in the studies may bias the results. To minimize the risk that these results are a function of variations in the studies, each finding in the following sections was subjected to critical scrutiny to determine the potential for bias. Study variations examined include study quality, study design, sample size, time from Head Start to outcome measure, and study date. The results of this analysis are presented in Appendix A.

One study characteristic, the study design, was consistently related to the magnitude of the effect size. Studies that compared the cognitive performance of Head Start children at the start of the program to that at the end of the program (with no comparison group) yielded larger effect sizes than studies that compared Head Start children to children not enrolled in the program. To control for an unequal distribution of these two designs across the categories being analyzed, weights were used so that there were an equal number of pre/post effect sizes and two-group comparison effect sizes in each category.[1] The figures in this chapter reflect this adjustment. Because a large number of studies used pre/post designs, the overall result of the adjustment was to reduce the size of the Head Start effects presented in the tables. The effects of other study characteristics were less pervasive: their potential for bias was noted in few analyses. When noted, the influence of these other study variables is mentioned in the text, but no statistical correction is made.

KINDS OF COGNITIVE GAINS

Cognitive gains in Head Start were grouped into four categories--basic competency, school readiness, achievement and other cognitive development. Basic competency includes problem solving ability, reasoning, mastery of concepts and critical thinking. It is measured most frequently with a standardized IQ test. Readiness for school refers to the set of skills like motor control, language development and understanding of mathematical concepts that contribute to successful transition to the school. Achievement refers to the mastery of subject matter. Other areas of cognitive development include the rate of grade retention or placement in special education. A more complete description of these categories is provided in the preceding chapter.

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[1] This procedure is analogous to the unweighted means analysis of variance procedures as described by Winer, B.J. Statistical Principles in Experimental Design. New York: McGraw Hill, 1962, p222ff.

Head Start appears to have a positive effect on each of these areas of cognitive development. Gains are reported in basic competency, school readiness, and achievement both at the end of Head Start and during the next three years. In two areas--basic competency and achievement--the gains appear larger when measured at the end of the Head Start program than when measured during the following three years. In contrast, school readiness gains showed no decline.

The cognitive gains made by Head Start children at the end of the program and during the next three years are illustrated in Figure 3.1. Throughout this chapter, we employ bar charts such as Figure 3.1 to show the magnitude of cognitive gains. In each chart, the average effect size is shown at the end of the bar. The effect size may be positive, in which case the bar is above the center line, or negative, in which case the bar is below the center line. Below each bar is "S," which shows the number of studies providing effect size data for that bar, and "n," the number of effect sizes averaged in that bar. The first bar on the left represents a gain at the end of the program by Head Start children in basic cognitive competency of .47 standard deviation. This estimate is based on 87 effect sizes provided by 25 studies. The last bar on the right represents a effect size of .23 in achievement up to three years after

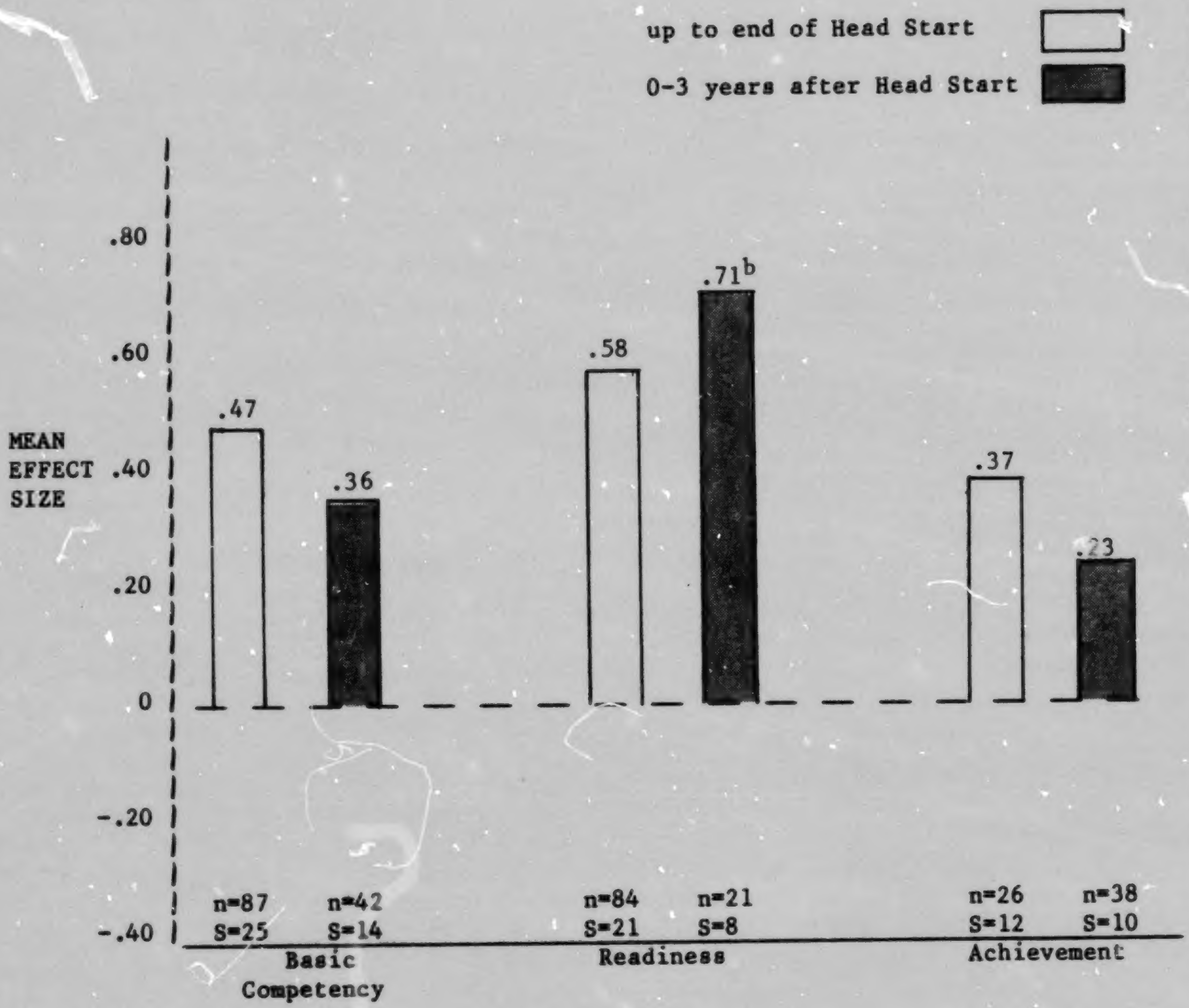

Figure 3.1 Cognitive Gains During and After Head Start[a]

[a] This figure excludes 103 effect sizes that could not be linked to a specific time since Head Start, as well as those effect sizes that measure cognitive outcomes more than three years after Head Start or other cognitive outcomes.

[b] This category includes eleven effect sizes from two studies based on relatively small samples. These effect sizes were noticeably larger than others in the category and may cause the category mean to be overestimated.

Head Start, an estimate based on 38 effect sizes from 10 studies. It is important to note that the total number of studies (S) indicated for each figure may exceed the 71 studies reviewed for this paper. The multiple effects sizes calculated for many of the studies sometimes result in one or more of the effects sizes from the same study falling into separate categories in the figures.

The gains made in these three areas of cognitive development are encouraging in view of the standard accepted by many educators that gains of a quarter of a standard deviation or more are educationally meaningful. That is to say, gains of this magnitude are thought to produce noticeable positive changes in classroom performance.

Only 30 effect sizes on cognitive outcomes beyond three years were identified. While this is too few for further quantitative analyses, the results show evidence of long-term gains in cognitive development, namely in grade retention and a reduction in special class placements. However, evidence of gains in other areas such as basic competency or achievement is weak.

THE HEAD START PROGRAM

The Head Start program has developed and grown across nearly two decades. The early period of Head Start, 1965 to 1969, was characterized by considerable diversity in program design and implementation. Since 1969, Head Start has undergone wide-reaching changes in staffing, parent participation, program management and participation.

"The significance of these shifting program, child, and family factors can be fully understood only when it is recognized that Head Start changed on almost all the variables that have emerged in the child development research literature as associated with differential outcomes: parent participation, duration of the program, staff characteristics (level of education, specific training on early childhood education, and age), and child and family background characteristics (age, ethnicity, prior preschool experience, father presence, family SES, and mother's employment)" (Collins, 1981, p. 30).

With accumulated experience and experimentation, policies and program options developed that improved the impact of Head Start. Figure 3.2 compares the cognitive gains of children enrolled in Head Start during its early phase of operation with the gains of children enrolled during the seventies. In all areas of competency the research indicates larger gains for children enrolled since 1970. Because of the magnitude of the difference in effect sizes measured during the early phase of the program and those measured since 1970, a series of tables is provided in Appendix F that illustrates cognitive gains in each of the two periods by program characteristics.

Over the years there have been a number of variations in Head Start programs. There have been part-day and full-day programs, programs that offered special training for parents or staff and those that did not, programs with experimental curricula and those modeled on traditional nursery schools. Variations such as these, introduced either for experimental purposes or simply as an adaptation to community needs, provide valuable data on how selected program alternatives affect cognitive development. In the following sections, we compare cognitive gains of children enrolled in Head Start programs of differing duration, staffing, location and content.

Program Duration

Since the early Westinghouse study (1969) reported that children in full-year Head Start made small cognitive gains but children in summer-only

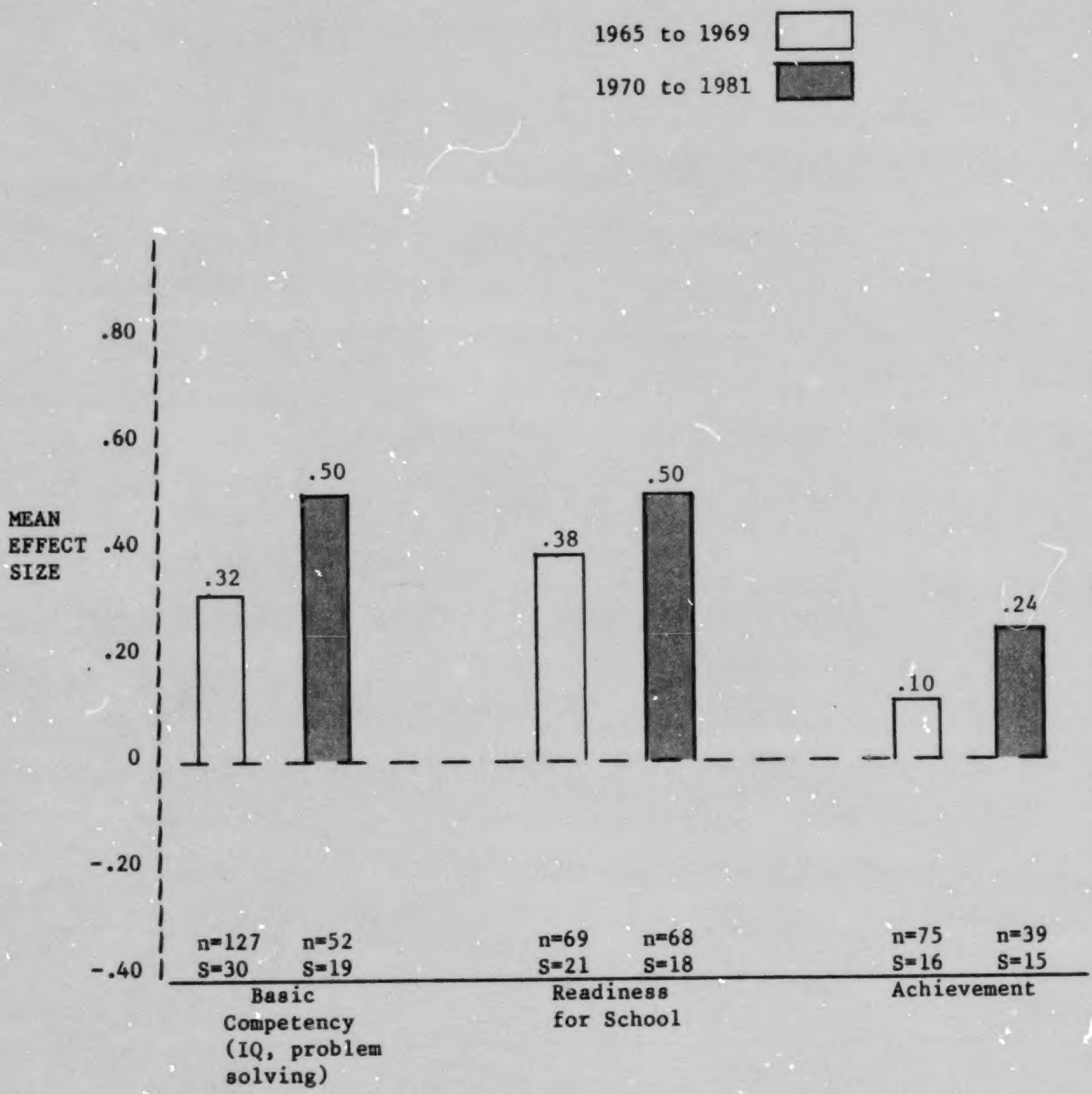

Figure 3.2 Cognitive Gains by Period of Head Start

programs did not, there has been a debate on how much Head Start is needed to maximize child development. Intuitively, it might appear that if some is good more is better--that is, as the number of hours, days, months, and years in the program increase then the size of the cognitive gain would increase. However, it is equally plausible that there is an optimal level of program duration beyond which additional cognitive gains are trivial in size. Very few studies have directly evaluated the effect of differences in program duration. However, by coding the duration of programs attended by children whose cognitive performance is evaluated, we are able to compare the average gains in programs that vary in length and intensity.

Most Head Start programs run five days a week. In this review, only two studies provided data on Head Start programs running less than five days a week. Thus, no attempt is made to compare program duration by days per week. The Head Start programs did, however, vary in the number of hours per day and the number of months per year they operate. For example, 16 studies are based on programs lasting up to four hours per day, 11 on programs lasting more than four hours a day. Similarly, four studies looked at Head Start programs of less than eight months compared to 51 that investigated those lasting longer. Although the majority of the Head Start studies on cognitive development provided no information on this subject, there are sufficient studies with data on duration to investigate its effect on cognitive development.

We chose to compare those programs that operated more than four hours a day Head Start with those that operated four or fewer hours a day. The comparison split the studies into two nearly equal size groups of effect sizes. In the research included in this review, most programs longer than four hours operated six hours a day. Shorter programs, of up to four hours daily, typically operated three hours a day. The children in Head Start programs longer than four hours fared slightly better than children in programs lasting four or fewer hours a day. Figure 3.3 illustrates the difference between an effect size of .32 for the shorter programs and .42 for the long day programs. Previous meta-analyses of the effects of hours per day indicated a weak difference in the opposite direction.[2]

There is also evidence suggesting that programs longer in months and years result in larger cognitive gains. When the Head Start programs are grouped into those that operated less than a full school year, (eight months per year or less) and those that operated for a school year or longer (more than eight months per year), the results indicate that children in the longer duration programs made higher gains. The average effect size for children in programs of less than eight months per year was .16 compared to .39 for children in programs operating eight months or more as illustrated in Figure 3.4. The difference in programs of fewer than eight months and those of longer duration is particularly noticeable in the studies of Head Start since 1969.

The analysis of study variations indicates that these results may underestimate the difference in cognitive gains between programs shorter than eight months and those longer. Compared to shorter duration programs, a larger portion of the longer duration programs included in the analysis: (1) were from Head Start programs earlier than 1970 and (2) measured outcomes a long

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[2] This analysis is based on a larger group of Head Start research projects than the earlier preliminary report, The Effect of Time in Head Start on Children's Cognitive Development and on Family Impacts (1983). In addition, certain studies of special Head Start programs included in the earlier review were excluded from this review.

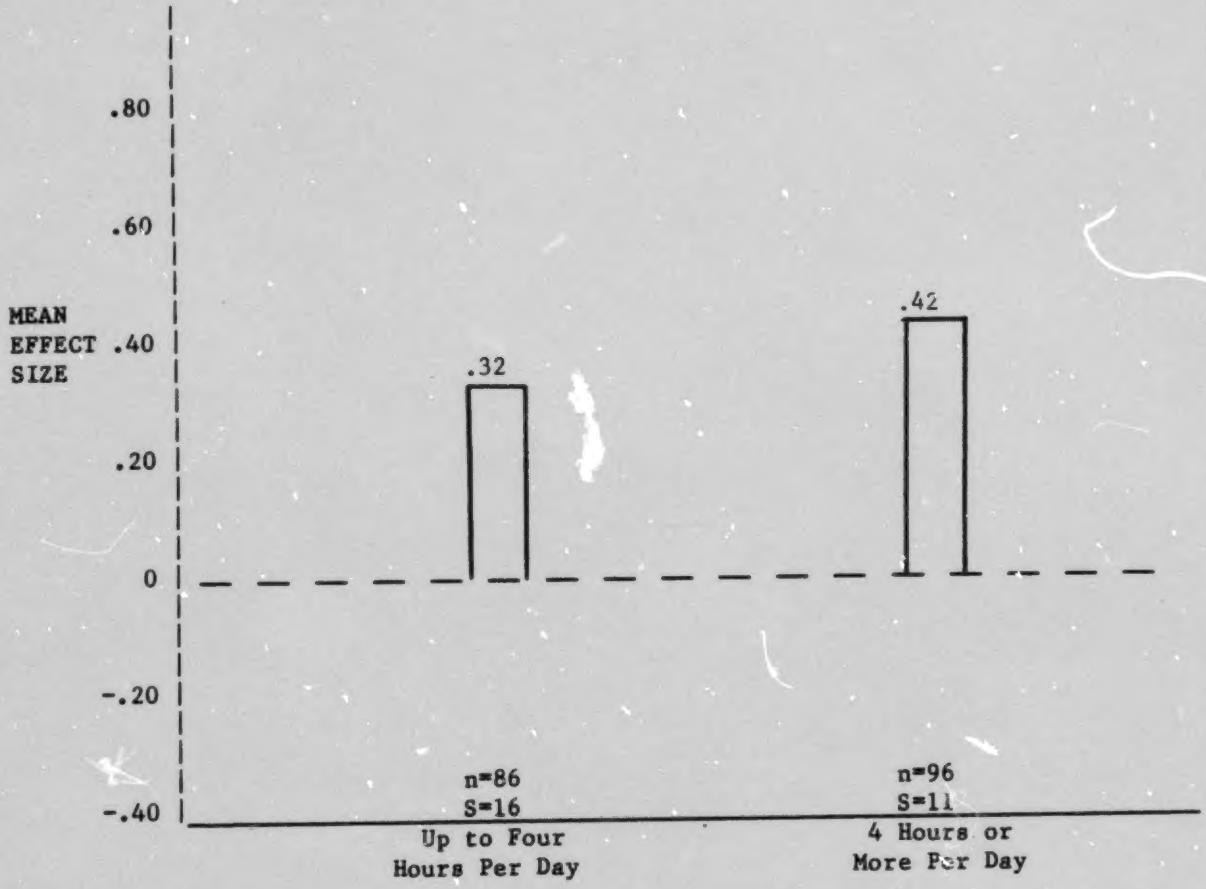

Figure 3.3 Cognitive Gains by Hours per Day[a]

[a] Previous meta-analysis of the cognitive gains by hours per day reported in the preliminary report on The Effect of Time in Head Start on Children's Cognitive Development and on Family Impact (1983) showed the reverse: slightly larger gains by children in part-day programs.

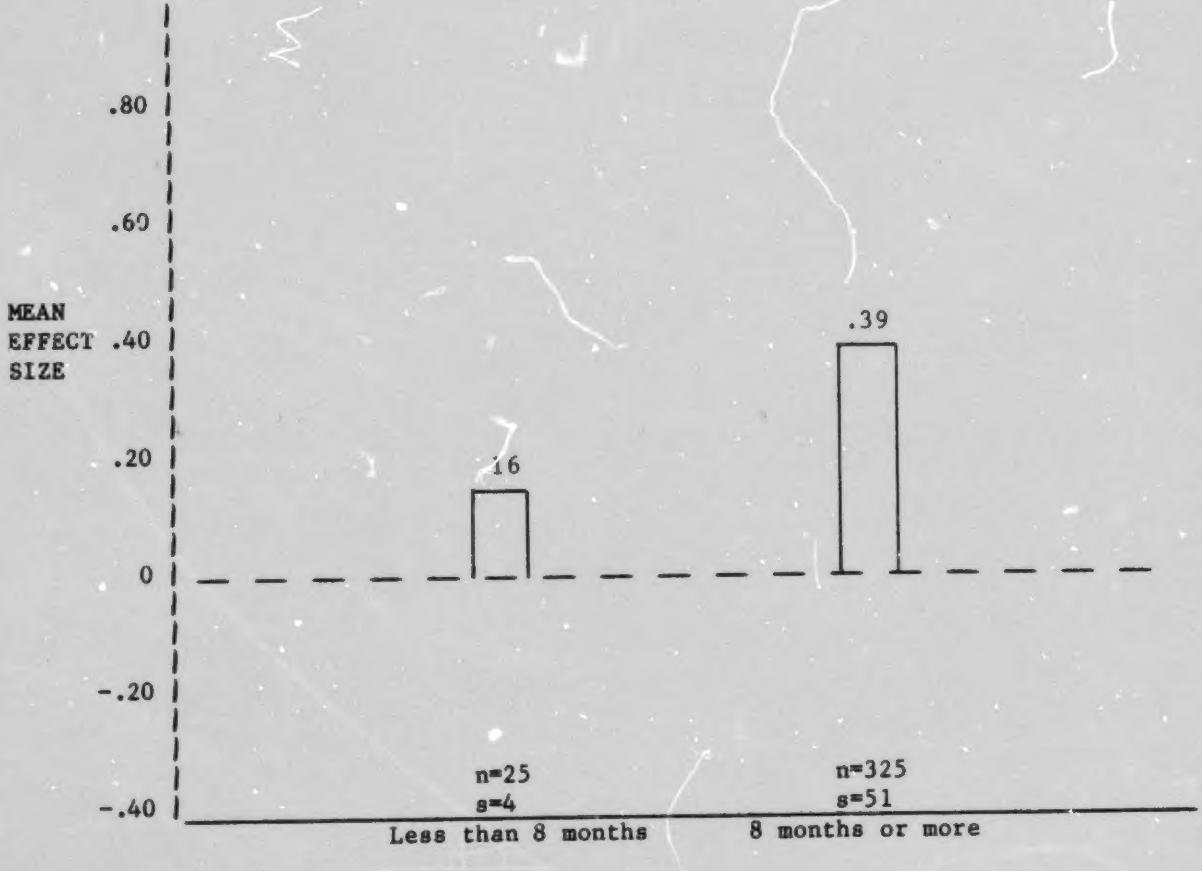

Figure 3.4 Cognitive Gains by Months Per Year of Head Start

time after program completion. Both of these factors would tend to depress the average effect size for the programs eight months or longer.

An analysis of total duration of Head Start showed that children enrolled in Head Start for a total period of ten months or longer averaged an effect size of .61, double the .30 effect size of children enrolled for a shorter period of time. This last finding is offered tentatively, as the estimate for children enrolled in Head Start for ten months or more is based on 24 effect sizes from four studies.

Classroom Composition

Early childhood theories have long pointed to the importance of adult-child personal interaction for child development. Young children are expected to make the greatest cognitive gains in programs that provide adequate contact with adult caregivers. The question is, of course, what is adequate? What is the optimal balance between a low ratio of children to teachers? Ideally, perhaps, the optimal balance would be one to one--which might maximize cognitive growth. On the other hand, a high ratio of children to teachers would expand the number of children who could be served. Within Head Start, the benefits of intensive exposure to adult caregivers must be weighed against practical constraints. Limited resources must be stretched to serve as many children as possible while maintaining the quality and effectiveness of the program.

Two variables related to the child's opportunity for contact with adults in Head Start are class size and child/staff ratio. Children in larger classes are expected to have less interaction with adult caregivers and have smaller cognitive gains than children in smaller classes. To test this hypothesis, the effect sizes were grouped into three categories based on the average class size of children in the studies providing the data. The categories chosen, 13-15, 16-18, and 19 or more, divide the applicable effects sizes approximately in thirds. A comparison of the average cognitive gains of these three groups is consistent with the expectation that children in larger classes gain the least. As Figure 3.5 indicates, the size of cognitive gains is lower in classes with 19 or more children than in smaller classes. Children in classes with 15 students or fewer averaged an effect size of .53 similar to the gain of .50, and higher than the .37 for those in classes of 19 or more. However, the benefits to children in smaller classes were confined to 1965 to 1969 Head Start programs as shown in Table A.4 in Appendix F. Since 1970, the cognitive gains of children appear independent of class size.

Cognitive gains are also expected to correlate with the child/staff ratio. The smaller the number of children per staff member should, at least theoretically, increase the amount of time and attention available for each child. This should lead to larger cognitive gains. Contrary to this expectation, there does not appear to be a relationship between staff ratio and cognitive development. The average effect size was .37 for children in classes with staff ratios of up to 8/1 and .34 for those classes with a staff ratio of 8/1 or higher as Figure 3.6 illustrates. Of the 60 effect sizes related to child/staff ratios of 8 to 1 or less, a large number (53) referred to groups with a child/staff ratio of exactly 8 to 1. Of the 41 effect sizes linked to groups with a child/staff ratio above 8 to 1, more than half (24) referred to groups with a child/staff ratio of 13 to 1. A comparison of these groups does not show the expected benefits of a low child/staff ratio. This finding conflicts with those reported in other reviews (see Collins et al., 1982). It must be remembered that the studies on which this is based represent only a fifth of those included in the review; most studies just do not include this information.

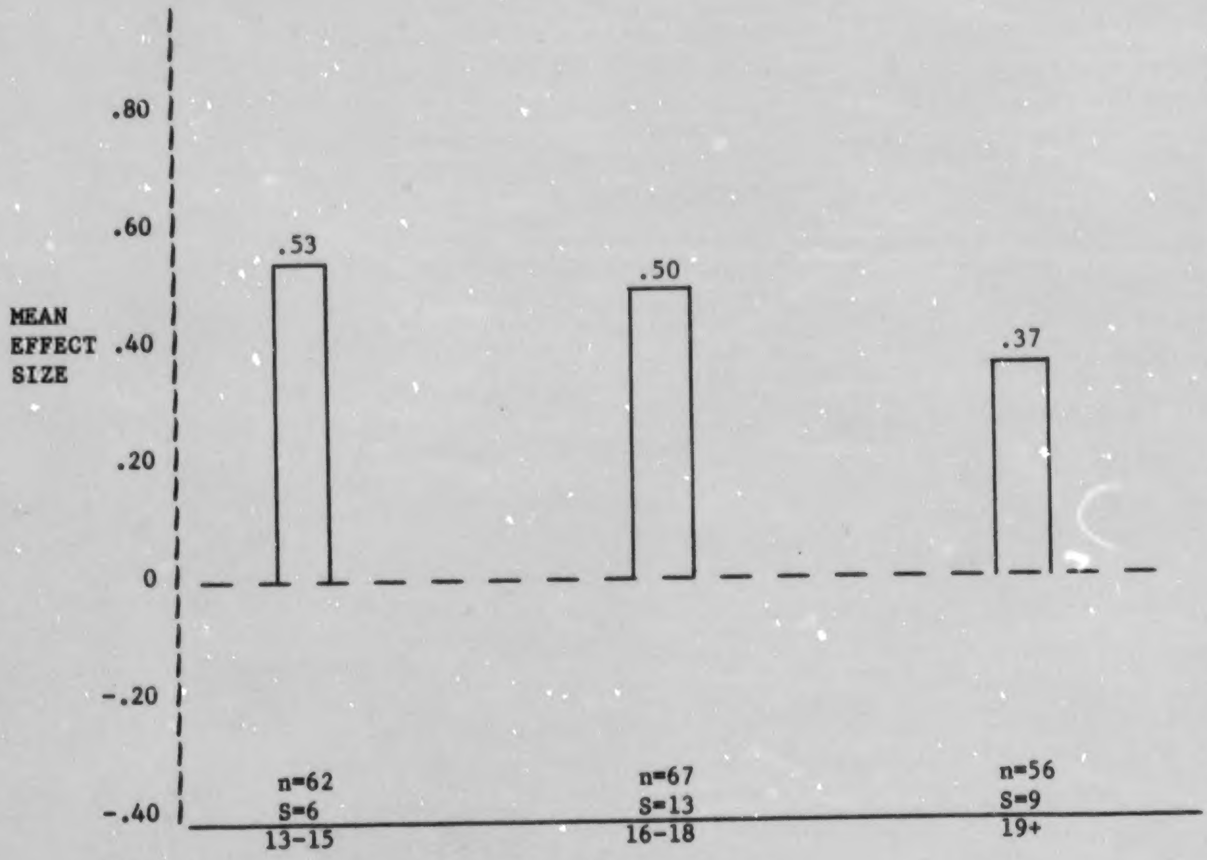

Figure 3.5 Cognitive Gains by Number of Children per Class

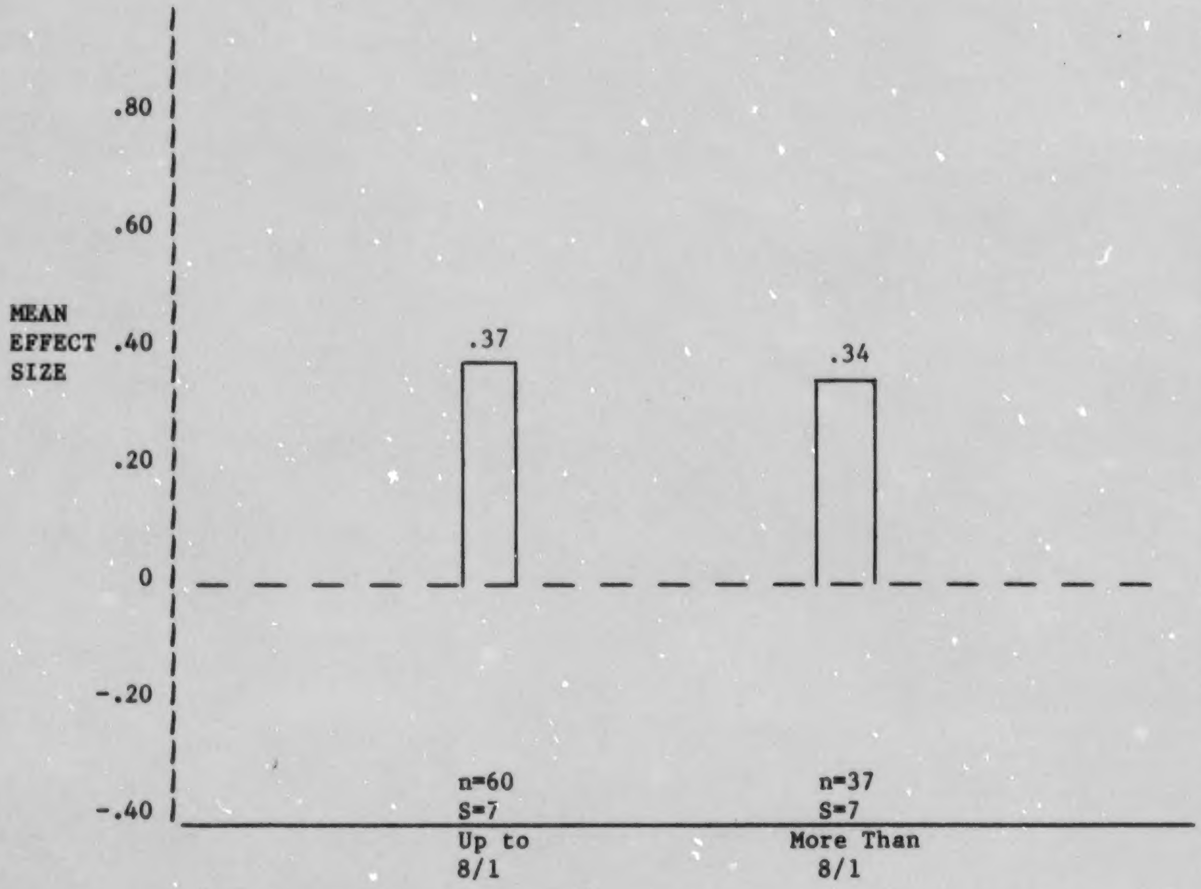

Figure 3.6 Cognitive Gains for Different Child/Staff Ratios

Staff Training

Do the training and qualifications of the Head Start staff have an impact on the cognitive development of the children? There are several specialized training programs that prepare teachers for Head Start. Head Start teachers may have received a Child Development Associate (CDA) degree, a degree in early childhood education, or teacher certification. These credentials are indications that staff members have been specially trained in the skills required in the classroom. Of these credentials, the CDA and the degree in early childhood education have been identified as having a positive effect on the performance of Head Start children (see Collins, 1981). The effect of teacher certification has not been demonstrated.

The limitations of the data require that we look only at overall staff qualifications and not at the effect of any one training credential. To do so, we combined data on the percentage of the staff with teacher certification, a CDA, and a degree in early childhood education into a single indicator of the percentage of staff with special training for Head Start. We found 21 effect sizes for programs in which 50 percent or more of the staff had received specialized training, 34 for programs in which 1 percent up to 50 percent had specialized training, and 27 in which none of the staff had special training.

Comparison of the cognitive gains across these programs is not consistent with the hypothesis that cognitive gains increase in size as the portion of specially trained staff rises. As Figure 3.7 shows, the gains in cognitive development vary up and down as the staff training increases. Grouping teachers with credentials such as CDA's and early childhood degrees with certified teachers may dilute the observed effects of special training.

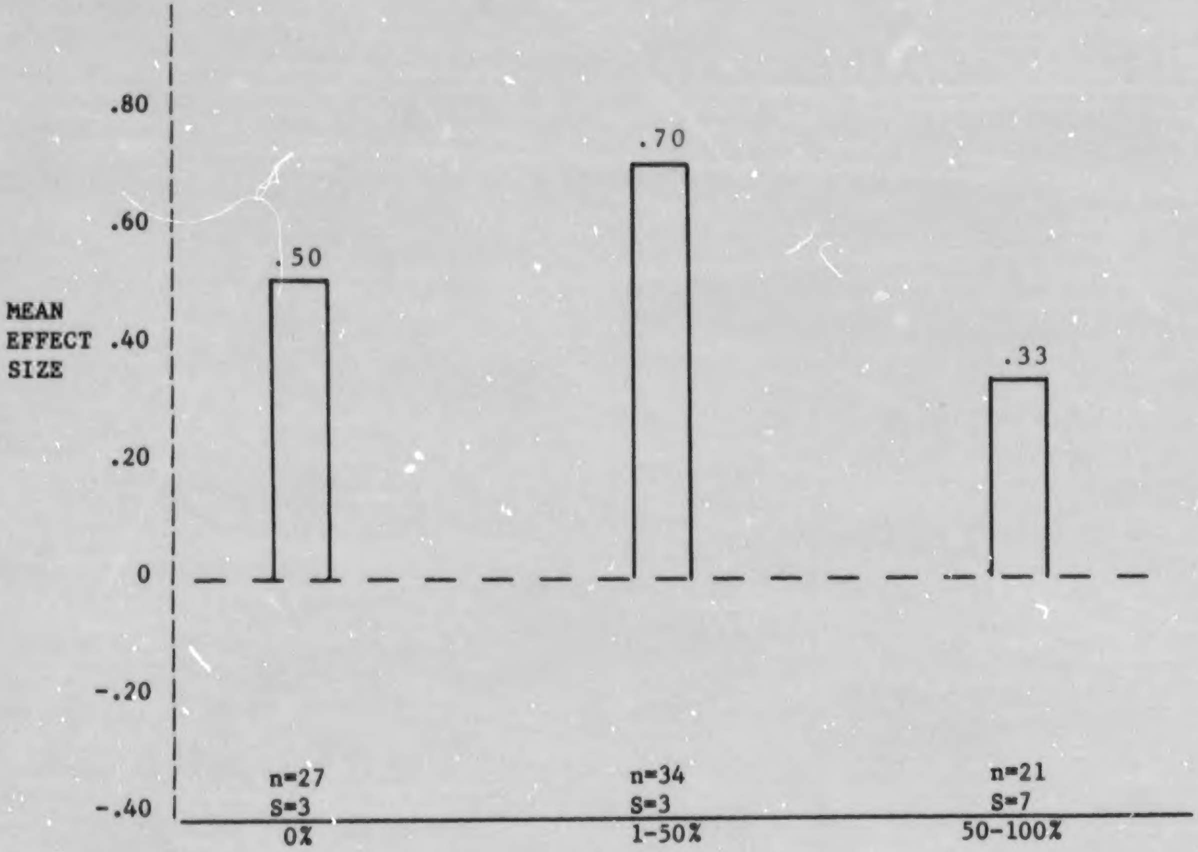

Figure 3.7 Cognitive Gains by Percent of Staff with Special Training*

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*Special training includes the Child Development Associate Degree and a degree in early childhood education--programs previously shown to have a positive effect on the performance of Head Start children--and teacher certification which may dilute the effects that would be observed for any one credential.

Special Parent Program

Head Start is a family-oriented program. Parents participate in program planning and volunteer in the classrooms. In some programs regular home visits by Head Start staff are scheduled. These activities are designed to benefit the entire Head Start family and provide additional resources to support child development during the nonschool hours. In addition to the parent activities regularly provided, many Head Start programs offer special parent programs such as training in child care or occupational skills.

Very little information is provided in the literature that can be used to relate the special parent activities to cognitive development. Three studies, yielding 44 effect sizes, reported on the cognitive development of children enrolled in a Head Start program with a special parent component, one offered in addition to regular Head Start parent involvement activities. The mean effect sizes were smaller in these programs than in the nine studies that reported no special parent programs, as Figure 3.8 shows. This surprising result may be due in part to certain problems encountered in implementing the experimental parent interventions such as those described explicitly in one study (Payne, 1970). It should also be pointed out that, because all Head Start programs have some kind of parental involvement activities, the power of the comparison may be reduced. Moreover, the analysis of study variations indicates the studies on programs without special parent activities tended to be Head Start conducted projects operating after 1970 and tended to have larger samples. These factors could be the source of bias favoring Head Start programs without special parent programs.

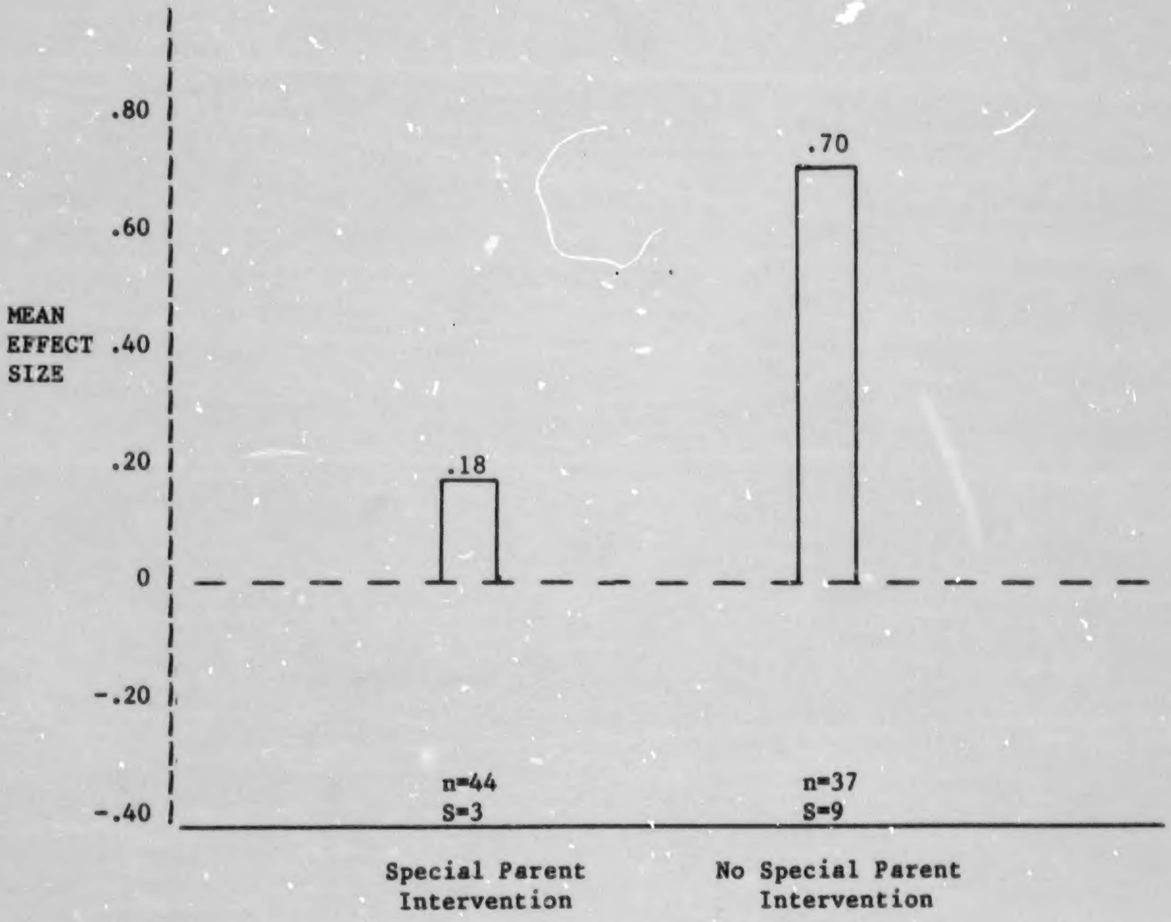

Figure 3.8 Cognitive Gains by Special Parent Interventions*

*Special parent interventions are those offered in addition to the mandated Head Start parent involvement services.

Studies reporting the type and amount of parent training and/or the number and frequency of home visits are so few that a quantitative estimate of their effect on cognitive development is not possible.

Curriculum

The curricula used in Head Start vary widely in content, teaching approach, and materials. A broad array of educational theories have been employed and tested during the history of the program. Generally, the curricula reported in the Head Start research literature can be grouped into three categories--cognitively oriented preacademic curricula, curricula oriented toward child's self-discovery and socialization, and curricula modeled on traditional nursery schools. The group of behavioristic cognitive curricula is composed of programs coded either general cognitive, Bereiter-Englemann, or Englemann-Becker models. The self-discovery curricula consist of those coded as new nursery school responsive model, DARCEE, Montessori, and general experimental.[3]

In general, the type of curriculum has little effect on the size of the cognitive gain as Figure 3.9 shows. Like other reviewers, we found that many different curricula appear to have been effective in enhancing cognitive development. Head Start programs using self-discovery curriculum produced gains slightly higher than those using cognitive or traditional curriculum, although the size of the difference is relatively small.

Program Operator

Head Start programs are operated locally by a variety of institutions--public schools, community action agencies (CAA), private schools and nonprofit

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[3] Programs using multiple curricula are excluded from this analysis because the effect sizes cannot be linked directly to a particular curriculum.

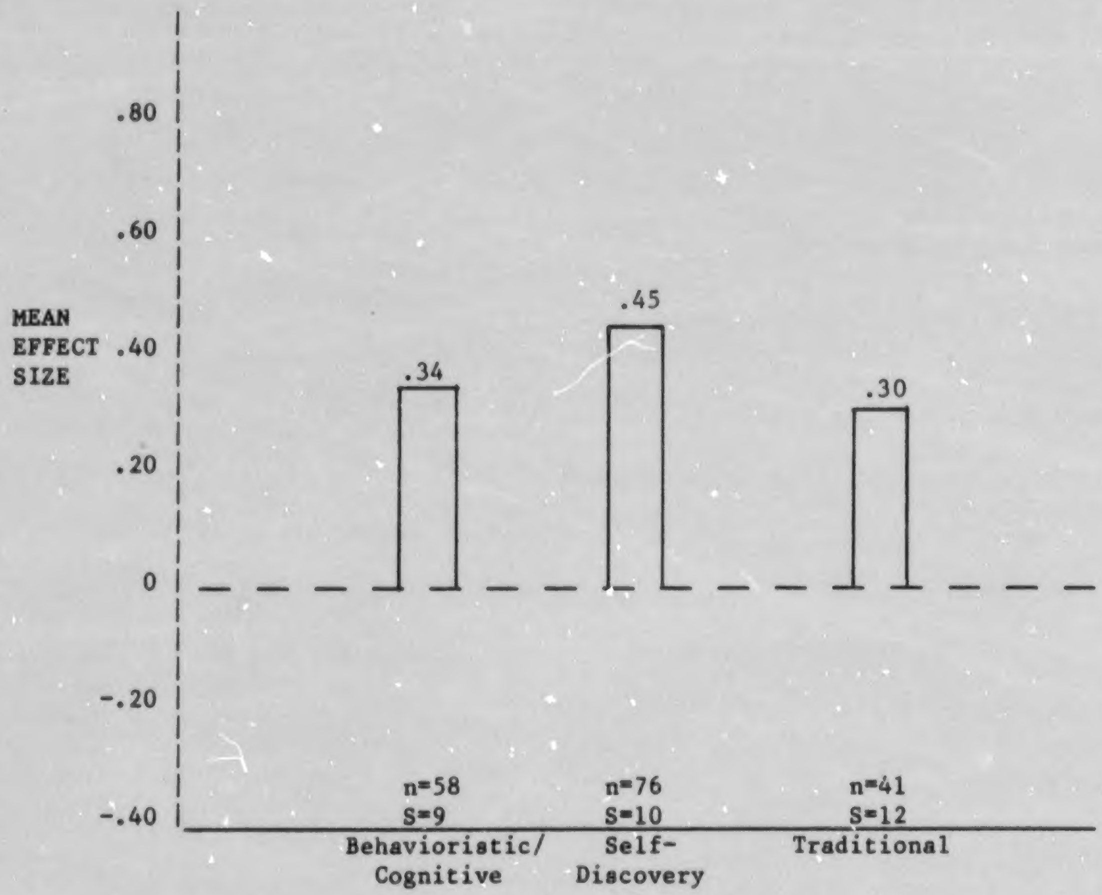

Figure 3.9 Cognitive Gains by Curriculum Type

organizations. These institutions vary in structure, size, goals and linkage to the community. They may also vary in their effectiveness. A comparison of the effect sizes from Head Start programs operated by different institutions indicates that cognitive gains made by children in public school Head Start exceed the gains made by children in programs operated by community action agencies and other institutions. Analysis of study variations revealed a substantial increase in CAA and public school Head Start studies conducted after 1970. This might increase the average effect size reported for children in Head Start programs operated by a CAA or public school.

CHILDREN SERVED BY HEAD START

The large majority of Head Start children are from disadvantaged families. Income and education levels are low. Familes are large and often only one parent is present. Despite this general profile, there are differences in the degree to which Head Start children are faced with economic, educational and cultural disadvantages--differences which may affect their progress in Head Start.

There are two plausible but competing hypotheses about the way in which social and economic circumstances could affect cognitive gains of the children. Head Start, as a compensatory education program, might be expected to have the greatest impact on the most disadvantaged children. That is, those children who enter the program with the greatest disadvantages have the most to learn and, thus, will make the largest gains. Conversely, it can be argued that children with more resources at home will be in a position to maximize their learning in the program.

These propositions are difficult to test with any precision in a review of the research. The very homogeneity of the Head Start classes on socioeconomic indicators permits few comparisons. More significantly, the effect sizes are based on the performance of groups of children and there may be considerable within-group variation. It must be remembered that the mean effect sizes illustrated in this section do not represent the attributes of any one child, but rather the average of the group participating in the study comparison.

We selected four indicators to represent the degree to which the children enrolled in Head Start are disadvantaged. These four include the average level of mothers' education, the percentage of children in single-parent families, the average number of family members, and the average IQ of the children at the start of the Head Start program.

Maternal Education

Mother's educational attainment can serve as an indicator of the family's socioeconomic status. Education is a consistent correlate of income and occupational status. The educational level at home may also be associated with family emphasis on educational goals and practices. Fifteen studies with a total of 82 effect sizes provided data from which the average maternal education could be calculated. Groups in which the average level of mothers' education was tenth grade or less are compared with groups in which the average level was eleventh grade or higher. This contrasts those of very low educational attainment to those average or above. The results are consistent with the assumption of compensatory education that the children with the greatest need will make the greatest gain. The findings indicate much higher cognitive gains for groups with lower levels of maternal education, as Figure 3.10 shows. However, the difference between low maternal education (.59) and higher maternal education

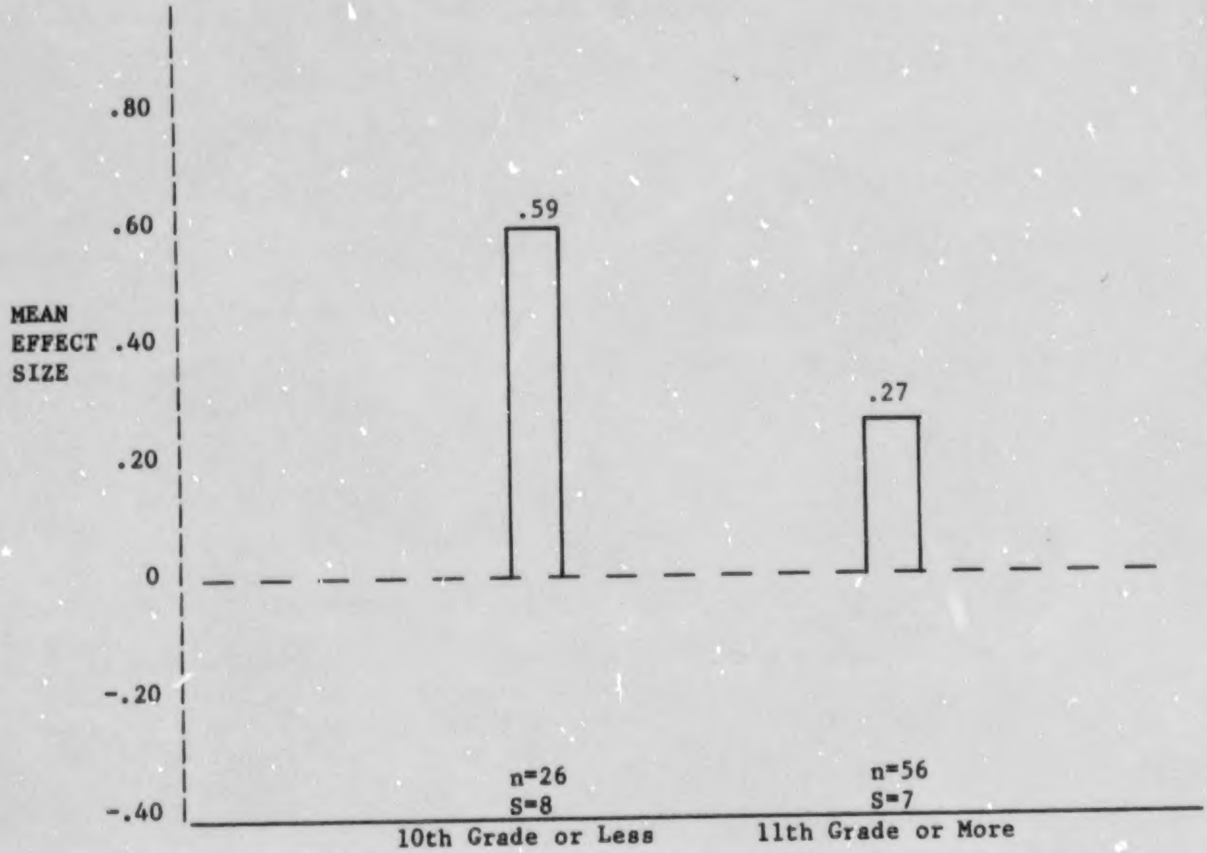

Figure 3.10 Cognitive Gains by Average Educational Attainment of Mothers

(.27) may be overestimated. Analysis of the study variations indicates that the higher education group contained more early (and low effect size) studies than the low education group. In addition, the low education group had studies with large samples which tended to raise the average effect size.

Single-Parent Families

The percentage of children in a single-parent family is another indicator of socioeconomic status. Single-parent families are generally headed by women and are far more likely to be poor than two-parent families. Seventy-eight effect sizes from 15 studies can be used to evaluate the performance of groups of Head Start children that differ on this variable. The effect sizes were divided into three groups by the percentage from single-parent families: 0 to 40, 41 to 60, and 61 to 100. Categories were selected on the basis of data availability. Figure 3.11 illustrates that cognitive gains appear to increase steadily as the percentage of children from single-parent families rises. Again, the neediest children appear to benefit the most.

Family Size

Family size may also be used to reflect both economic status and the potential availability to the child of parental time, attention and resources. Larger families are expected to have fewer resources per person and less time to devote to each child. Head Start families in the studies reviewed are relatively large: the average family size ranged from five to more than seven persons.

A comparison of the cognitive gains made by classes of children that varied in family size revealed that those in smaller families gained the most. The effect size of classes with families of five, shown in Figure 3.12, was .62

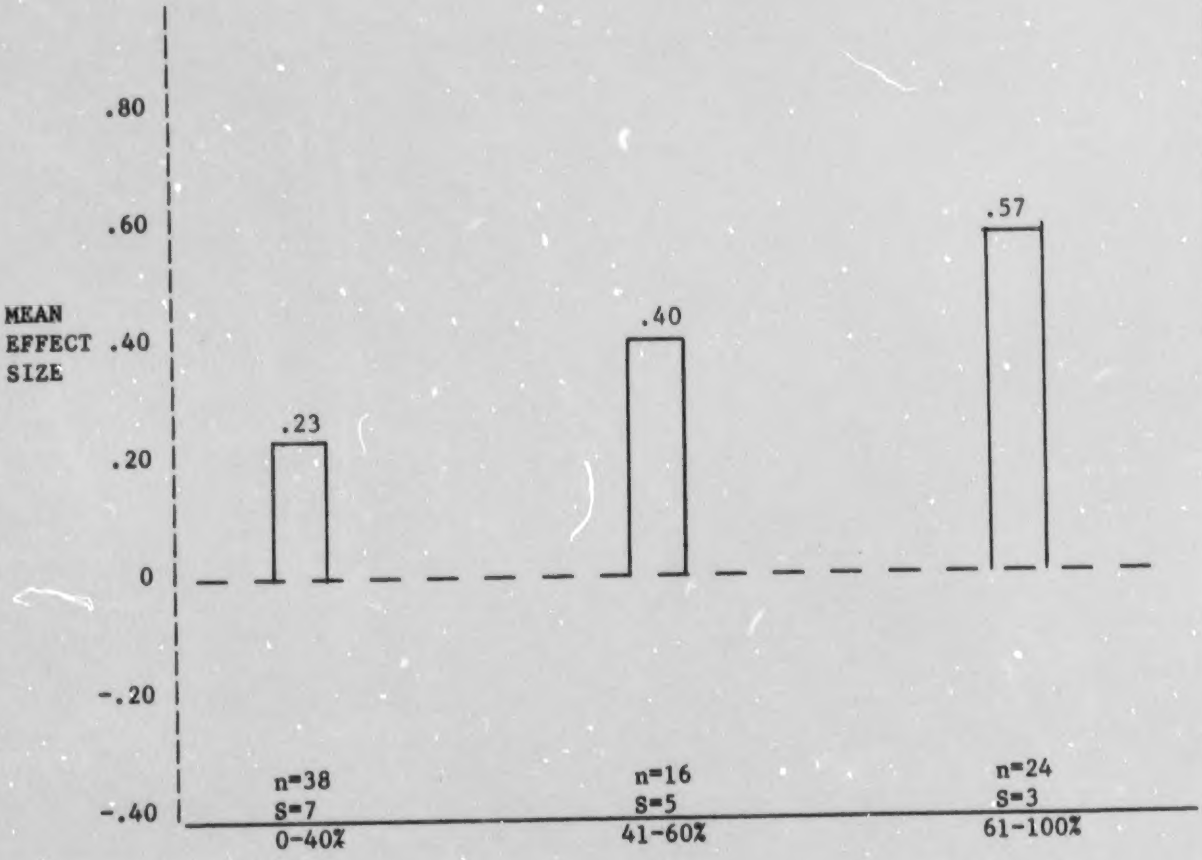

Figure 3.11 Cognitive Gains by Percentage of Single-Parent Families in Head Start

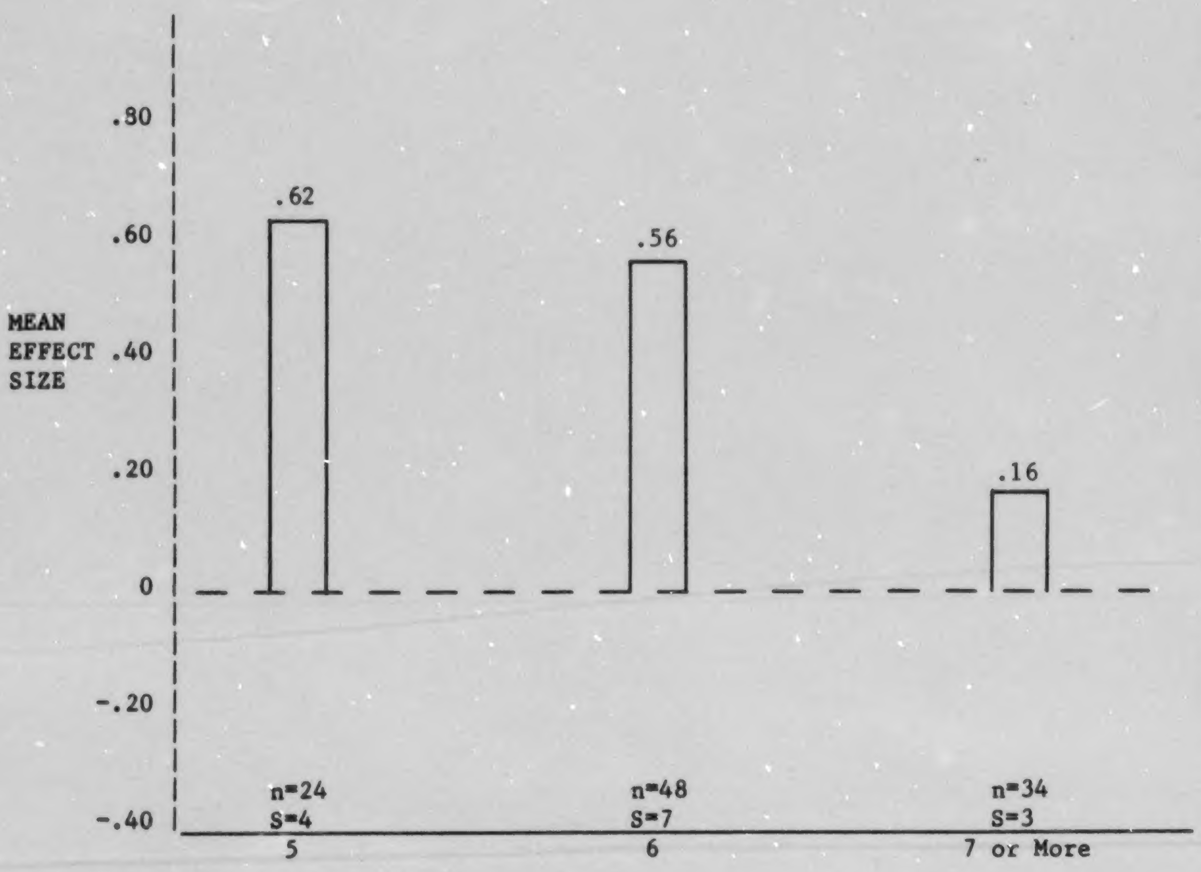

Figure 3.12 Cognitive Gains by Average Number of Persons per Family

which declined to .16 for classes with families of seven or more. If, as we have suggested, larger families are more disadvantaged, then this finding conflicts with the two earlier confirmations of the compensatory education thesis. A number of factors could account for the disparity in findings. First, it must be noted that the amount of data on all three indicators is limited. On a substantive level, it is possible that the time and attention available in small families interacts with the Head Start program independently of any economic feature of this variable.

IQ at Enrollment

A different form of disadvantage, an intellectual disadvantage, also may affect the benefits derived from Head Start. Many of the children enter Head Start with an IQ that is low average or below. For the 303 effect sizes reviewed, almost 20 percent were based on classes in which the average IQ at the start of the program was one standard deviation or more below the national norm (low competency). Another 50 percent were between one half and one standard deviation below the norm (low average competency), while a third were within a half of a standard deviation of the norm (average competency). Within the broad categories shown in Figure 3.13, the cognitive gain increased as the average score at the start of the program decreased. The low scoring children appear to make up some of their "low ground."

This gain must be interpreted with caution. The children may have scored lower at the start of the program for reasons unrelated to their basic cognitive ability such as nervousness at the pretest which disappeared by the time the program outcome was measured. Regression to the mean on the part of very low scoring groups is also a definite possibility in some studies.

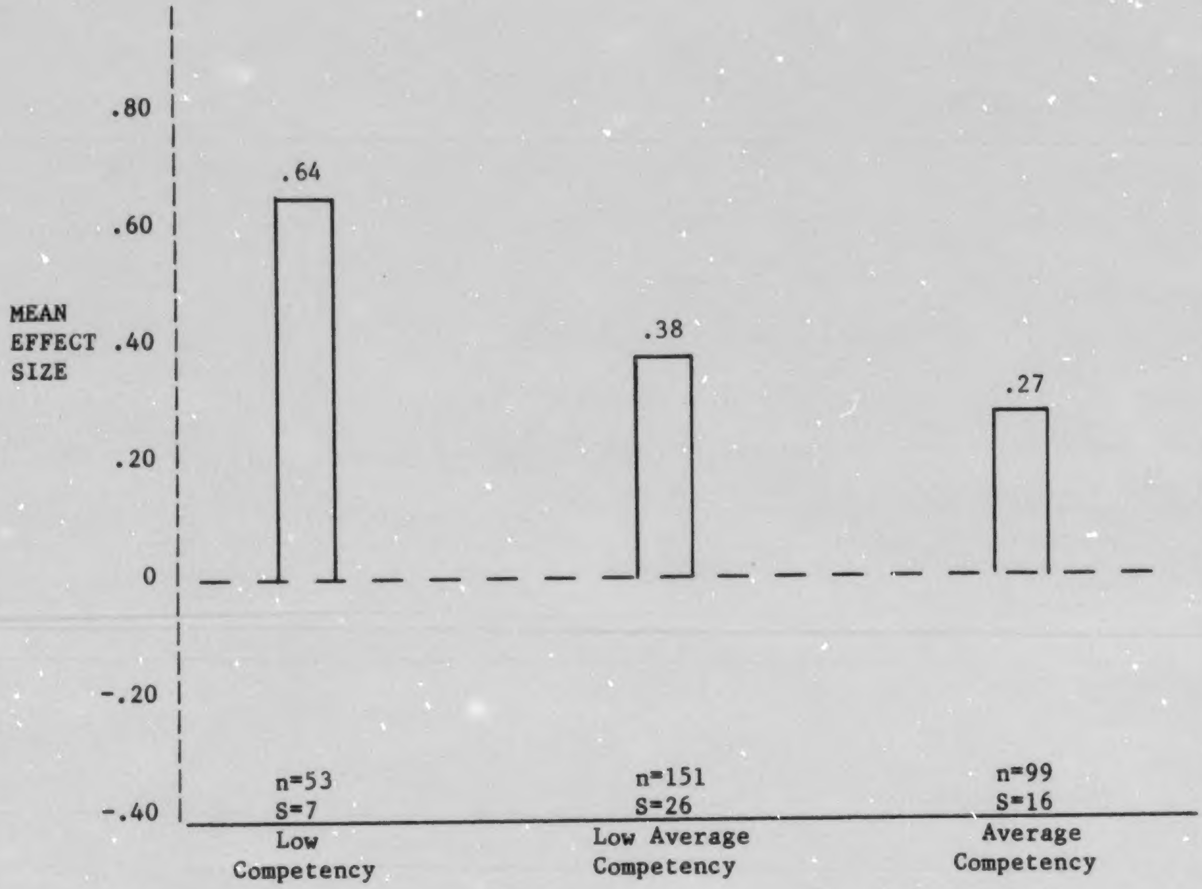

Figure 3.13 Cognitive Gains by the Average IQ Level at the Beginning of Head Start

Minority Children

A substantial portion of the children in the Head Start research we reviewed were from minority groups. This raises the question of whether maintaining an ethnic balance in the classroom should be an issue to program planners. Do children make greater cognitive gains in classrooms with a mixture of students than in ethnically homogeneous programs? The data, shown in Figure 3.14, indicate that classes where the percentage of minority children was between 26 and 89 percent (mixed) averaged substantially higher gains in cognitive development than classes of 90 to 100 percent minority students. There were too few effect sizes based on classes with 0 to 25 percent minority to evaluate the potential of loss from exclusively nonminority classes.

This difference becomes more impressive in view of the fact that the groups with a very large percent of children from minority groups are likely to have a large portion of more disadvantaged children. The preceding analyses indicate that the children who benefit the most from Head Start were those from families with lower maternal education, single-parent families and lower IQ scores. Minority group children have a greater portion of these attributes, yet Head Start groups that are predominately minority do not appear to be making the greater gains.

Age at Enrollment

Head Start serves children from three to the age of compulsory education. About 75 percent of the effect sizes included in this review measure the performance of children who began Head Start between their fourth and fifth birthdays. As Figure 3.15 illustrates, the cognitive gains associated with variations in the age of enrollment rise slightly with age at enrollment. The differences in gains do not appear to be large enough to be educationally meaningful. This result does not identify an ideal age for Head Start enrollment.

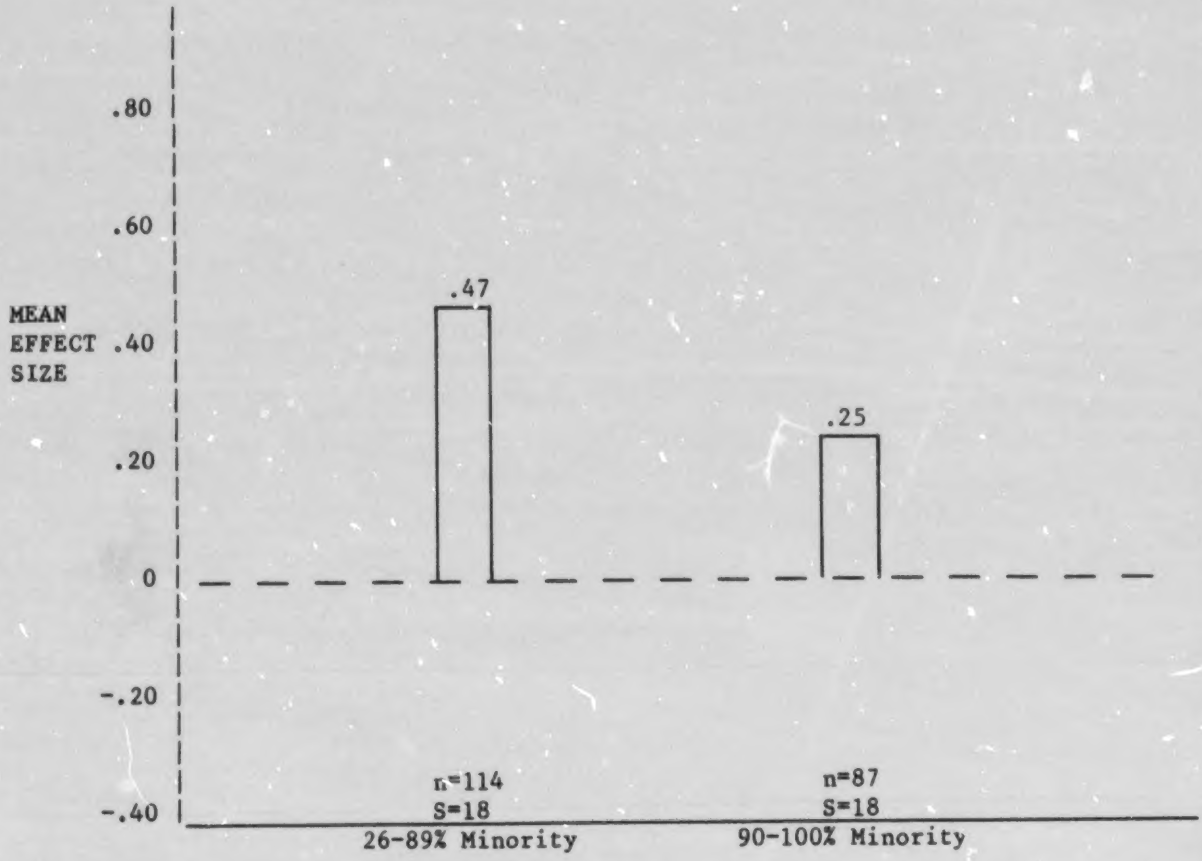

Figure 3.14 Cognitive Gains by Percentage of Minority Children in Head Start Program

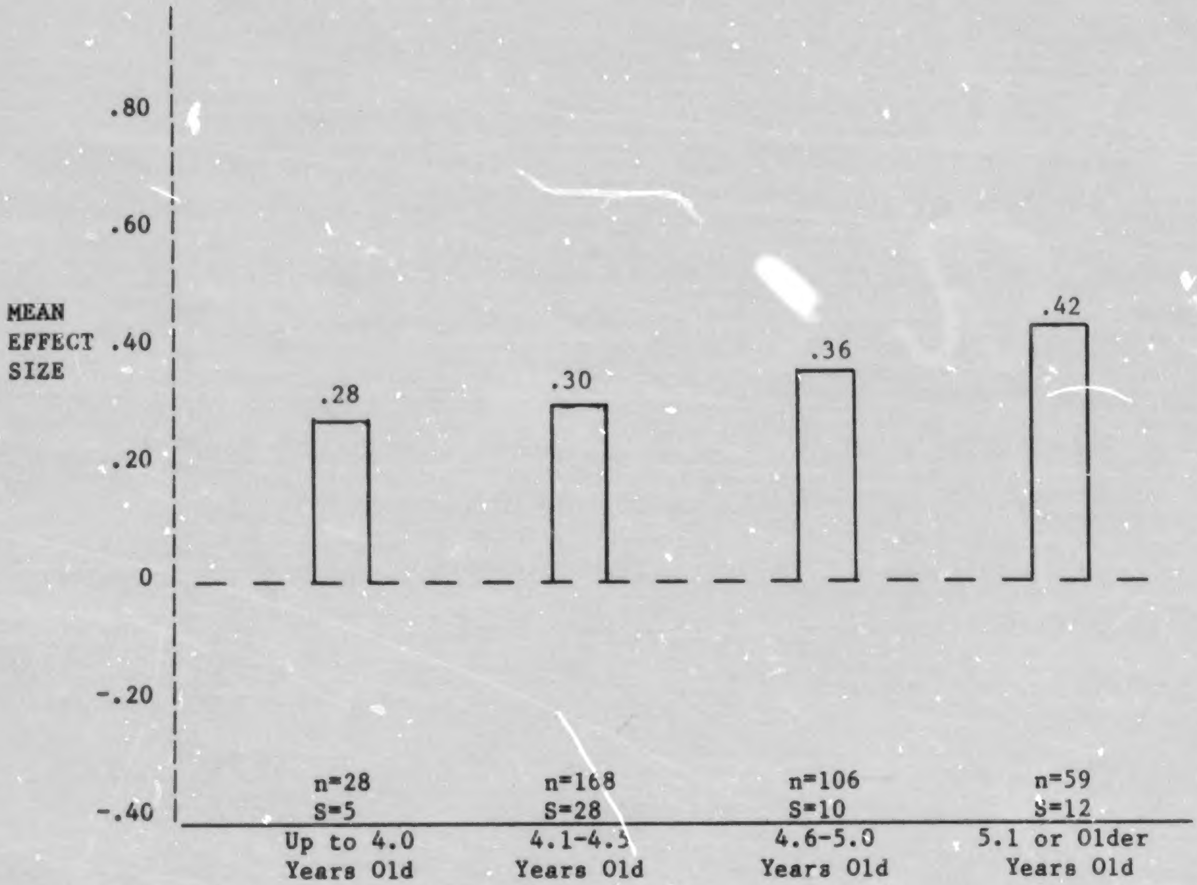

Figure 3.15 Cognitive Gains by Age of Enrollment

CONCLUSIONS

Head Start has a positive effect on cognitive development, an effect that has increased in magnitude since the program's inception. The gains are larger in the areas of basic cognitive competency and school readiness than in achievement. When the children were evaluated while still in Head Start, their cognitive gains averaged approximately half a standard deviation. Gains in basic competency and achievement show a moderate decline during the first three years following Head Start, although school readiness gains do not.

Long-term gains beyond three years could not be analyzed quantitatively due to the limited number of studies in this area. However, a qualitative review of the studies indicates gains in the form of a higher rate of grade retention by Head Start children and a lower rate of special education placement. No evidence of long-term gains in basic competency or achievement was found.

The magnitude of the cognitive gains by Head Start children has increased considerably since the program's inception in 1965. The gains made by children participating since 1970 increased from .32 to .50 in basic competency, .38 to .50 in school readiness and .10 to .24 in achievement. Because a large number of the studies reviewed were from the 1965 to 1969 period, overall estimates of cognitive gains may be on the low side.

It was difficult to identify the specific program characteristics that produce cognitive gains. The analysis failed to confirm earlier reports that child/staff ratio and staff training programs were related to the cognitive gains made by children. In part, the failure to observe a relationship may be due to wide variations across programs and studies. Differences in program design and implementation made comparisons based on a post-hoc classification difficult at best.

There was one program characteristic that is correlated with higher cognitive gains--program duration. Head Start programs that lasted less than a school year (less than eight months) produced smaller cognitive gains than those lasting eight months or longer. Similarly, children who attended Head Start for a total of ten months or longer gained more than those with less exposure to the program. In addition, gains from programs that lasted four hours a day or fewer were smaller than those from programs lasting more than four hours per day. This suggests that both intensity of exposure and the length of involvement in the program are related to its effect on cognitive development.

The children in the greatest need of Head Start seem to benefit the most. The more disadvantaged children, those from Head Start classes with a low-average level of maternal education and/or classes with a high proportion of children from single-parent families, made larger cognitive gains than the less disadvantaged. Similarly, children with the lowest IQ at the start of the program showed the greatest cognitive gains, although problems of valid measurement and statistical regression to the mean require a cautious interpretation of this finding. These results indicate that Head Start may be achieving the largest cognitive gains for those who need it the most--the more disadvantaged children. This evidence of Head Start's effectiveness suggests that the program is accomplishing one of its major goals.

More discouraging, from a policy-making perspective, is the failure to identify more program characteristics associated with larger cognitive gains. It would be extremely useful to be able to develop guidelines for the optimally effective Head Start program. One explanation for the difficulty in finding program effects is that within the broad ranges of Head Start policy options, there are alternative methods of running a Head Start program that are equally successful in terms of their effects on cognitive development. Certainly, the frequently reported finding that various curricula are equally successful is consistent with this idea. Conversely, it can be argued quite fairly that there are often insufficient data from which to draw any conclusion. Certain areas of significant policy concern, e.g., program staffing, have received little attention in the research literature. In the reports that follow in this series of analyses of Head Start research findings, particular attention will be devoted to examining in greater detail the effect of classroom characteristics such as staff training and class size on a broader array of child outcomes.

As a guide to the future, the results point to the potential importance of an ethnic mix in the classroom and to the utility of operating Head Start programs for a full school year or longer. Also, as a guide to the future, the analysis illustrates the dearth of research on topics like child/staff ratio and class size needed for Head Start.

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APPENDIX A

VARIATIONS IN HEAD START STUDIES

This section summarizes the characteristics of the Head Start studies included in this quantitative synthesis. Differences inherent in the design and execution may well have an independent effect on the magnitude of cognitive gains reported. For example, the Head Start studies with samples of 150 or more children show higher gains than those with smaller samples. For this reason, the Appendix describes in more detail the characteristics of the studies reviewed and evaluates the relationship between the study characteristics and the magnitude of gains in cognitive development reported.[4]

Sampling

One factor that may affect the estimate of Head Start's impact is the representativeness of the sample. Eighty-three percent of the effect sizes are from samples drawn from a single community. The large number of single site studies raises the possibility that the effect sizes may not be representative of the national Head Start program. These effect sizes averaged .32. In comparison, the 74 effect sizes based on national samples was higher at .43. The relatively small difference may be due to larger sample sizes or to the additional resources generally invested in national evaluations.

A closer look at the effect of sample size showed larger gains were reported by studies with more than 150 Head Start children in the sample (see Figure A-1). Studies of this scope are in the minority; only 20 percent of those reviewed included samples of this size.

There were several analyses in which differences in sample size were noticeable. In the comparison of Head Start characteristics, small sample size may have lowered the average effect size for programs with special parent intervention programs, those with traditional curricula, and those with more than 50 percent of staff with special training (and those with no special training). In the comparison of child characteristics, large sample sizes may have enhanced the average effect size of Head Start children with lower mean IQ scores and a lower level of maternal educational attainment (tenth grade or less).

---

[4] The figures presented here are not adjusted for study design (unlike those in the body of the report).

Type of Comparison

The effect sizes used as estimates of the impact of Head Start on cognitive development are based on a comparison of two groups. The comparisons included in this review were one of three types:

1) a comparison of Head Start children before and after their participation, a pre/post treatment comparison;

2) a comparison of Head Start children after participation with similar (disadvantaged) children not enrolled in any preschool program; and

3) a comparison of children in Head Start with an experimental component with those in regular Head Start.

Almost half the effect sizes were based on pre/post comparisons, while slightly fewer were based on a Head Start/no treatment comparison. Only 42 were based on a Head Start/Head Start comparison. There are striking differences in the magnitude of the effect sizes, as Figure A-2 shows. The pre/post designs yield an average gain of .61, compared to .09 for the Head Start/no treatment comparison.

The size of the pre/post comparison is not entirely surprising. Children are expected to develop across this period of their lives. Although controls for normal maturation were included in calculating the effect sizes, the magnitude of this gain relative to the others suggests either that the children gained extremely rapidly or, more plausibly, that the controls used were insufficient.

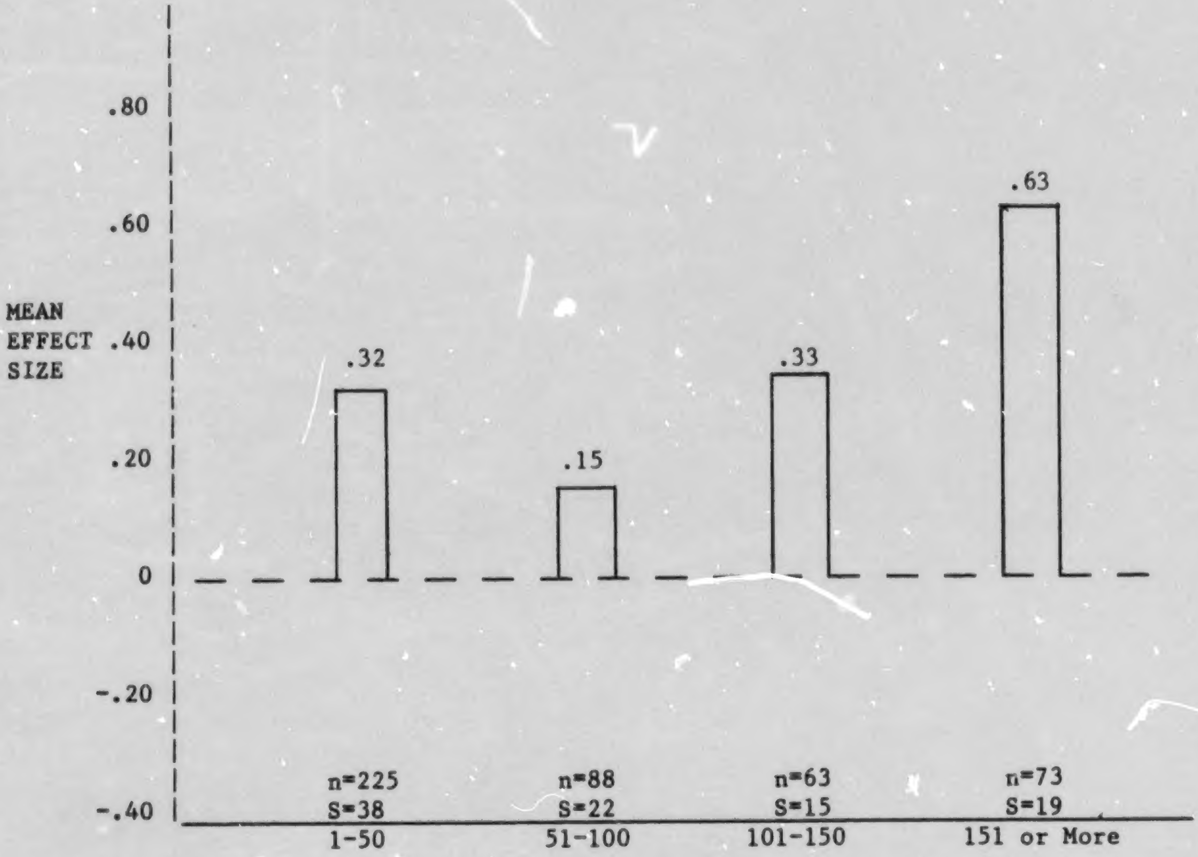

Figure A-1 Cognitive Gains by Sample Size

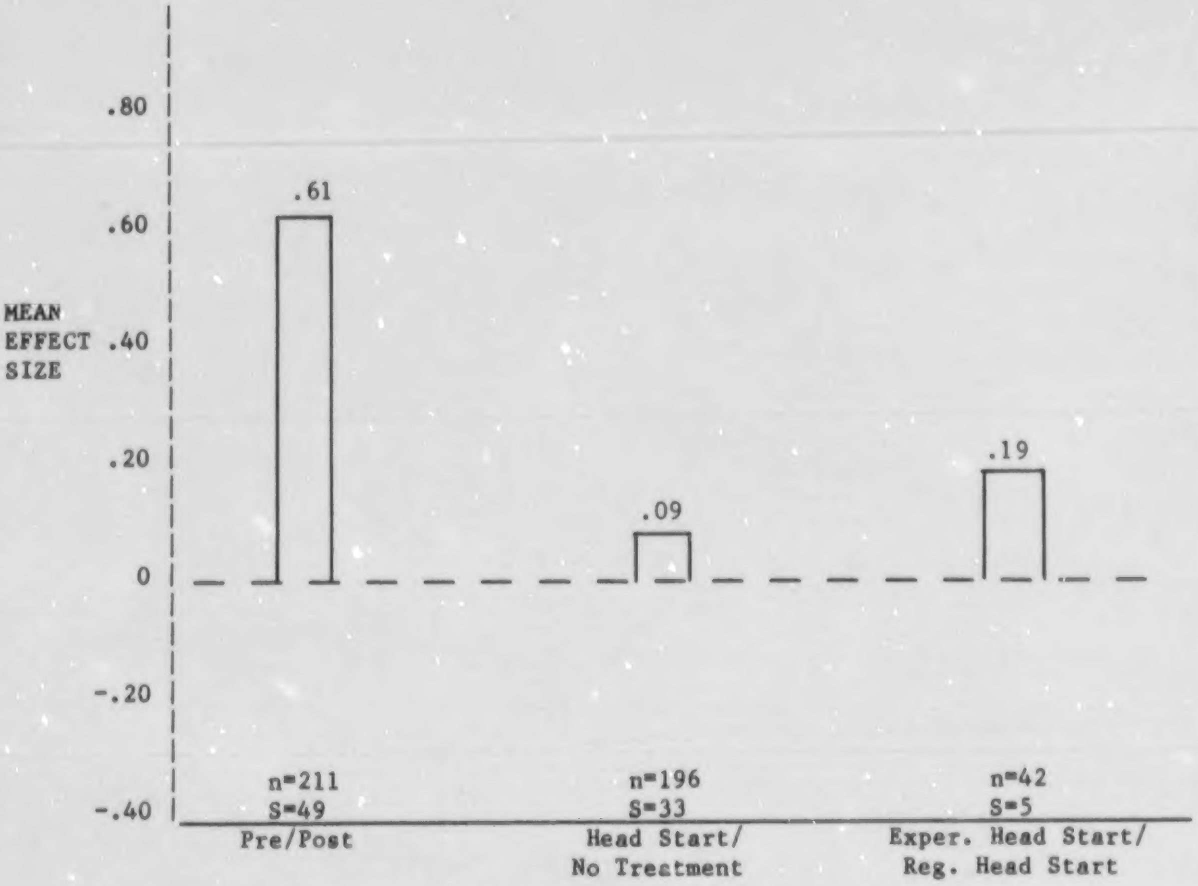

Figure A-2 Cognitive Gains by Type of Comparison

Tables A.9 through A.21 in Appendix F describe in greater detail the cognitive gains that these different types of comparisons yield by showing the effect sizes by program characteristics. For almost every variable the effect sizes for a pre/post comparison are two or three times the size of those for other comparisons. One exception is curriculum. For this variable the Head Start/no treatment comparison shows gains as large as the pre/post comparison for cognitive and self-discovery curricula.

As noted in the body of the report, the findings presented have been adjusted to correct for the apparent bias introduced by this aspect of the study designs. The method selected was to standardize the mean effect sizes by treating each category as though it contained an equal number of pre/post designs and comparison group designs.

Study Quality

To some extent the research on Head Start has been a large national experiment in how to evaluate a social program. The difficulties of designing and implementing well-controlled, statistically sound experiments on program impact have received a great deal of well-deserved attention. To evaluate the threat to the validity of our conclusions posed by the diversity in study quality, we grouped the studies viewed into two very broad categories, good and poor, on the basis of the following criteria:

- Good quality studies include all true experimental designs that are either well executed or have only minor or moderate problems in execution. Also included are quasi-experimental designs that are well executed or with only minor problems, and well-executed pre/post designs.

- Poor quality studies include all pre/post designs that are not well executed as well as quasi-experimental designs with moderate or major problems and true experimental designs with major problems.

Over half of the effect sizes were derived from studies of poor quality. However, as Figure A-3 illustrates, differences in study quality have almost no effect on the size of the cognitive gains reported. Detailed analyses of the comparisons presented in the report also indicate that study quality as measured by the criteria described above had little effect on the results.

Timing of Measurement

As Figure 3.1 indicated, the cognitive gains in all areas are larger when measured near the end of the Head Start program than when measured during the first three years after Head Start. Further investigation of this difference suggests that the effect on the results of this difference has been minimal, due in part to the fact that the correction for pre/post designs versus other designs had the effect of correcting for differences in measurement time. (Most prepost designs measured the outcomes near the end of the Head Start program.)

Head Start programs operating eight months or longer per year (compared to shorter programs), programs with a child/staff ratio of 8 to 1 or lower (compared to program with a child/staff ratio over 8 to 1), programs with a self-discovery type curriculum, and programs operated by public schools rather than the other agencies contained a large number of effect sizes based on measurement obtained at the end of the program.

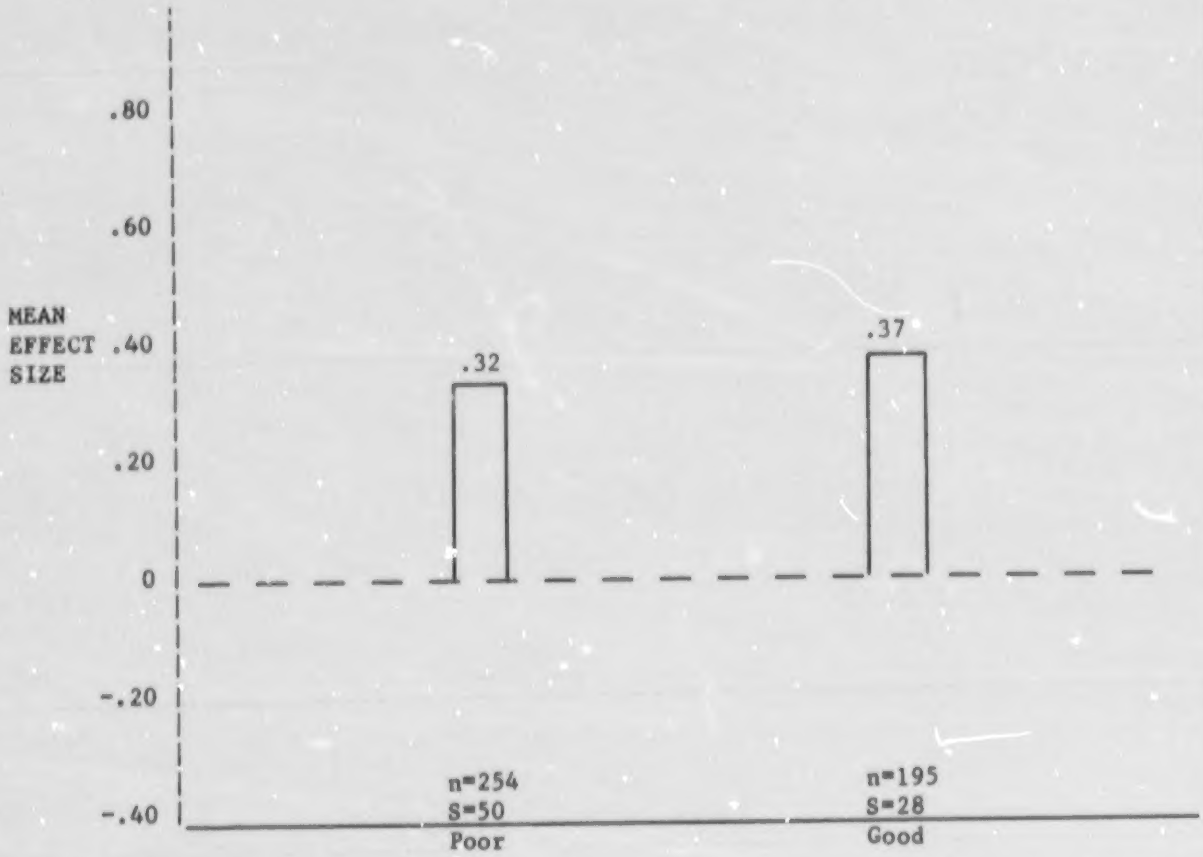

Figure A-3 Cognitive Gains by Quality of Study

Summary

The studies that provided the findings for this quantitative synthesis of the Head Start research literature differed in design and methodology. Of the study variables investigated three were found to be related consistently to the magnitude of the cognitive gain reported. These variables were type of comparison (prepost versus two group), study date, and sample size. As described, a control for the type of comparison was introduced into the analysis due to the consistency and magnitude of the bias. The effect of the other variables was, in most cases, to underestimate the cognitive gains in Head Start. Studies of Head Start before 1970 yielded much lower effects than studies of Head Start in recent years, yet over 60 percent of the effect sizes were from studies conducted in the 1965 to 1969 period. Studies with large samples, over 150 children, reported gains twice as large as studies with smaller samples. However, only 73 of the 449 effect sizes were based on samples of over 150. The effect of these study differences on particular comparisons is noted above and in the findings chapter.

APPENDIX B

LIST OF DATA BASES SEARCHED TO COMPILE HEAD START DATA BASE

The primary data source for the Head Start Evaluation, Synthesis and Utilization Project has been the Education Resources Information Center (ERIC) system. However, other data bases also were carefully searched, including:

- AGRICOLA, Dept. of Agriculture Database;
- BBIP, Books-In-Print Database;
- BOOK, Books Information Database;
- DISS, Dissertation Abstracts;
- ECER, Exceptional Child Database;
- GPOM, Monthly Catalog of U.S. Government Publications;
- IHSP, State Publications Index;
- NCMH, Mental Health Clearinghouse;
- NCFR, Family Resources Database;
- NRIC, National Rehabilitation Information Clearinghouse;
- PSYC, Psychological Abstracts;
- SMIE, Smithsonian Science Information Exchange;
- SSCI, Social Science Citation Index;
- ULRI, Ulrich's Index of Periodicals;
- USBE, Universal Serials and Book Exchange;
- MESH, Medical Subject Headings - Medline; and
- SPIF, School Practices Information File.

A manual search of the following libraries also was conducted:

- Department of Health and Human Services;
- Department of Labor; and
- Library of Congress.

APPENDIX C

LIST OF KEY WORDS USED TO INDEX HEAD START LITERATURE

CODING SYSTEMS DEFINITIONS

A. Type of Document

Each document receives one of the following codes to describe the type of information included.

Code

99 Major Evaluation--Code later.

1 Research--Documents that present descriptive data, and/or research findings. All documents that include data or findings are coded research, even those that also include tests, bibliographies and policy analyses.

2 Research-related--Documents that discuss research plans, methodology, tests, questionnaires and bibliographies, but do not include data or findings.

3 Policy/planning--New analyses, position papers, newspaper articles and speeches that discuss issues related to Head Start. Include those that refer to research but do not present findings of data.

4 Legislation

B. Subject Matter

Each document receives as many of the following codes as needed to describe the topic:

Code

5 Health--refers to studies of the screening, diagnosis, and treatment of the medical needs of Head Start Children. It includes studies of nutrition, preventive health care including immunization, dental care, and mental health care (including psychological testing and referral services).

6 Community Impact--refers to the effects of Head Start on the neighborhood or community. It includes studies of the relationship of Head Start to other social services, the schools, and other community institutions.

7 Family Impact--refers to studies of both the effect of Head Start on families (e.g., the employment of mothers, the ability of families to care for their children) and the effect of the family structure, behavior patterns, and support on the Head Start program and child performance. It includes studies of parental attitudes and childrearing practices.

8 Handicapped--refers to all studies of Head Start services to handicapped children and of the performance of handicapped children enrolled in Head Start. It includes studies of diagnoses and special services.

9 Home Start--refers not only to studies of the "Home Start" program, but also to studies of other preschool services provided to children and their families at home.

10 Follow-Through--refers to studies of the Follow-Through program (kindergarten through grade 3) services and the performance of children enrolled in Follow-Through.

11 Long-term effects--refers to studies of the effects of Head Start that persist beyond the completion of third grade. It includes studies of school retention, school performance, school placement, as well as subsequent social adjustment.

12 Management--refers to studies of staff training, staffing, program organization and implementation, budgeting, and accounting.

13 Teaching methods--refers to studies of Head Start curriculum content, materials, teaching techniques, program content and structure. It includes the Planned Variation studies.

14 Costs--refers to data that describe the costs of Head Start services and programs, that examine sources of funding and that present cost/benefit evaluations.

15 Parent Participation--refers to studies that explicitly examine the kind and amount of parent participation in Head Start and its effects on child performance or families. Note that it is a required component often referenced, but should be coded only when findings or data are presented. Include studies of parent attitudes.

16 Social/Emotional Development--refers to studies of social adjustment, self-esteem, locus of control, personality, self-concept, attitudes, values and emotional health. It can include studies of school adjustment, delinquent behavior and other forms of social adjustment.

17 Poverty--refers to studies of the economic status and progress of Head Start families and the problems associated with the disadvantaged status of Head Start children.

18 Day Care--refers to services that provide essentially custodial care for preschool children; that is, that do not include the instructional component of Head Start. It should include, however, extended day services provided by Head Start for the children of working parents.

19 Social Behavior--refers to classroom adjustment, play and studies of behavior problems, e.g., hyperactivity, aggressiveness.

20 Services Provided--refers to descriptive information on the type of services provided, the number of children served and their characteristics, etc.

21 Cognitive Development--is a general term used to refer to studies of intellectual growth that either 1) include all three of the specific areas listed in 22, 23 and 24, or 2) are directed at other areas of development such as attention or academic achievement.

22 Cognitive Development - Reading--refers to studies of reading readiness and reading performance.

23 Cognitive Development - Language--refers to studies of written and oral language development and performance. Includes studies of auditory skills.

24 Cognitive Development - I.Q.--refers to studies of aptitude or ability, often recognizable by the tests given--the Stanford-Binet, the Weschler, ...

25 Bilingual--refers to studies of children for whom English is a second language [includes not only Spanish, but many other dialects].

26 Special Population--refers to studies of Head Start services for special population and/or the characteristics and needs of these populations.

C. Form Codes

The folowing indicate form codes:

81 Not in Head Start Library.

82 In Head Start Library in hard cover only.

83 In Head Start Library in microfiche only.

84 In Head Start Library in both hard cover and microfiche.

Code	
1	Research
2	Research-related
3	Policy/planning
4	Legislation
5	Health
6	Community Impact
7	Family Impact
8	Handicapped
9	Home Start
10	Follow-Through
11	Long-term effects
12	Management
13	Teaching methods
14	Costs
15	Parent Participation/Parent Attitudes
16	Social/Emotional Development
17	Poverty
18	Day Care
19	Social Behavior
20	Services Provided
21	Cognitive Development
22	Cognitive Development - Reading
23	Cognitive Development - Language
24	Cognitive Development - I.Q.
25	Bilingual
26	Special Population

APPENDIX D

CODING MANUAL AND FORM

GENERAL CODING CONVENTIONS

(1) Code with a #2 pencil.

(2) Try to code each document in one sitting. If study is not appropriate for meta-analysis, indicate reason on study cover sheet. Please be explicit and detailed in your explanation.

(3) Use 998 whenever the variable is "not applicable". Use 999 for "impossible to determine" or "missing data." Use zero only as a real number. Every cell in a utilized column of the coding sheet must have data, the "not applicable" code or the "missing data" code.

(4) Whenever an item asks you to code X or Y (like the Mean or Median I.Q.) and both are reported in the document, code the first mentioned thing (the Mean in this example) in the appropriate space. Record the second thing (median) at the bottom of the page.

(5) Be sure to fill in all digits including the leading zeros. Note that all decimal places are precoded on coding format.

(6) Varying types of duration/intensity measures are used; e.g., hours/day, days/week, months/year. In converting from reported data to these measures use: 1 month = 4.3 weeks = 30 days. Note that if converting to or from units/year, the number of months the program operates should be used. For example, if the coding calls for hours per month and the study reports 120 hours a year and a 10-month program, then hours per month = 120/10 = 12. The months per year a program operates is referred to throughout as the "operating year."

(7) Duration coding - If the posttest took place during treatment, duration should be measured from pretest (or beginning of treatment if there is no pretest) to posttest. If posttest administered after treatment, duration should be measured up to treatment termination.

If necessary, make the following assumptions:
"full year" = "operating year" = 9 months
"half/part day" = 4 hours
"full day" = 6 hours

If the variable is an "average," compute the weighted average whenever possible. For instance, if the variable is the average number of home visits, and the document indicates all parents received 3 and 20% received 4 or 5, the weighted average would be computed as follows:

$$\text{weighted average} = \frac{80(3) + 20\,\frac{4+5}{2}}{100} = 3.3$$

(8) If a variable calls for a mean or median value (such as mean age of subjects) and the range is reported, record the midpoint of the range. If the report says the range was from X_1 to X_4, but most were between X_2 and X_3, record your best guestimate of mean age. (If range is 3 to 7, but most are 3 to 5, a reasonable guestimate would be about 4.7.) Note that the midpoint of 3 to 5 is midpoint of 3.0 to 5.99 which is 4.5.

(9) All documents reporting analysis of the same data base should be coded as a single "study." A "study" includes, for example, all interim reports, reports on different topics or reports using different analytic perspectives (including secondary analysis). As long as a document reports data on the same group(s) of children, it is part of the same study. Each study has a unique 4-digit ID number. If you are coding a document which seems to be related to another document but is not so identified, see Harriet. Also, there is a notebook of documents related to a single study.

(10) Each column of the coding sheet is to be used to code a single comparison. The codeable comparisons are: Pre/post or HS vs. no treatment. For a pre/post comparison, G1 = posttest measure and G2 = pretest measure. For a HS vs. no treatment, G1 = HS and G2 = no treatment. When the comparison is pre/post, all the subject characteristics will be the same for G1 and G2.

Also, if groups are different on any coded variable and separate outcomes are provided, code as different comparison groups (e.g., sex, race/ethnicity). If separate groups are used, do not compute total group scores. Examples below:

For pre/post: If both the pretest measures and posttest measures are presented separately by categories in this coding system, there should be two comparison groups. For example,

Boys pre/post
Girls pre/post

You should not have total group pre/post if same outcome measures are used. Also, you will not have girls vs. boys pre or post.

For HS-No-trt: The same principle applies. For example,

HS boys vs. No-trt boys (gain or posttest scores)
HS girls vs. No-trt girls (gain or posttest scores)

The same principle applies to special curriculum or experimental treatments:

If the experimental treatment within the HS program is at least 4 months and at least 1 hour per full day, code as a separate comparison group (also for full year-8 month-at least 1/2 hour per day). For example,

HS with special trt pre/post   HS without special trt pre/post

In addition, you will have a comparison group and code HS with special treatment vs. HS without special treatment.

When you have an experimental curriculum treatment within the HS program, it should be coded as an "18" under item "20. Type of Curriculum."

(11) All outcomes for a given comparison must be coded in the same column used to describe the comparison, using additional outcome coding forms as necessary. Each outcome uses a separate card. These are labeled card 010, 020, 030, 040, 050.... The card numbers should match the outcome number shown in item 101--outcome 001, 002, 003, 004....

IDENTIFICATION

(1) Study ID #

Coding convention:
Record Study ID noted on cover sheet.

(2) Type of Document (1 = jrnl, 2 = book, 3 = thesis, 4 = government or contractor publication, 5 = unpublished, 6 = multiple types

Coding convention:
Monographs are nonjournal publications of less than 150 pages and all Government Printing Office publications unless they are journals. Do not code anything printed by the authors' own organization as a monograph or book; these documents should be coded as a 5 (unpublished), but a university press should be considered separate from the university whose name it bears.

If a study has several documents which are of different types, record code "6" (multiple types).

(3) Date of study (68 = 1968, 81 = 1981)

Coding convention:
Record the year the most recent preschool Head Start cohort included in the study completed preschool HS. If reported as a school year (e.g., 1973-74) record the spring semester year (e.g., 74). If data not provided, use the year the first post-treatment document was published using the following conversions:

Type of Publication	Subtract X Years From Publication Date
journal	2 years
book/monograph	2 years
thesis	1 year
unpublished	0 years

(4) Coder ID #

Coding convention:
The coder IDs are:
01 = Sherrie Aitken
02 = Harriet Ganson
03 = Adele Harrell
04 = Andrea Shepard
05 = Laura Bonneville
06 = Gregg Jackson
07 = Karl White
08 = Kim Kelly
09 = Mary Dilworth
10 = Stephen Schneider
11 = Gerald Williams
12 = Barbara Barrett
13 = Gretchen Schultze
14 = Ruth Hubbell
15 = Harry Travis
16 =
17 =
18 =

(5) Total number of comparisons with effect sizes (two digits)

Coding Convention:
Record total number of comparisons for which effect sizes were computed. Number must match the number of columns filled in on coding sheet.

(6) Number of comparisons - Head Start vs. non-Head Start treatment

Coding Convention:
Record total number of comparisons that will not be coded for effect sizes.

(7) Total number of comparisons - Head Start vs. Head Start

Coding Convention:
Record total number of comparisons; these will not be coded for effect sizes.

(8) Card number

Coding convention:
This item is precoded

(9) Study ID

Coding convention:
Record the study ID in every column in which data will be recorded.

(10) Comparison # (two digits)

Coding convention:
Assign consecutive numbers to each column on the coding sheet in which you record data. If there are two comparisons being coded, the left most column is coded 01 and the next column to the right of it is coded 02.

(11) Basic kind of comparison (one digit)

Coding convention:

1 = One group: Head Start pre- and posttesting

2 = Two groups: Head Start vs. no treatment (it is stated explicitly that the no-treatment group did not participate in a preschool/day care program.

3 = Two groups: Head Start vs. no identifiable treatment

4 = Two groups: Head Start with experimental treatment vs. Head Start control

(12) Child and/or parent treatment

Coding convention:

1 = Child only; i.e., the only treatment described is a child directed treatment

2 = Parent and child separately; i.e., both child-directed and parent-directed treatment components are described and the treatments are administered separately. For example, there is a parent education component and a child education component.

3 = Parent and child together; i.e., the described treatment was primarily a simultaneous treatment of parent and child. For example, a home-based program which mother and child are treated together. Code as 3 if the dominant modality was joint treatment even if there was some nonjoint treatment. In the home-based example, code as 3 even if the parent attended a parent education class once a month.

(13) Type of predominant treatment

Coding convention:
1 = Standard Head Start (five days a week)

2 = Nonstandard Head Start (includes only variations in center attendance, home-based, and locally designed options)

3 = Standard Head Start with experimental treatment

4 = Nonstandard Head Start with experimental treatment

5 = Head Start not otherwise specified

6 = Head Start not otherwise specified with experimental treatment

7 = Multiple forms of Head Start (included subjects for more than one of the above listed types of HS)

8 = Multiple forms of Head Start with experimental treatment

If HS is described as five days a week and not identified as a 2 or 3, assume it is standard Head Start.

(14) Type of nonstandard HS or experimental HS treatment (three digits).

Coding convention:
998 = Not applicable unless item number 10 is coded 2, 3, or 6
1 = Variations in center attendance
2 = Home-based
3 = Locally designed options
4 = Planned Variation
5 = Other (specify on coding sheet)

(15) Type of organization providing educational treatment (three digits)

Coding convention:
1 = public school (or school system)
2 = private school (or school system)
3 = community action program (CAP or CAA)
4 = private/public nonprofit (e.g., churches, universities)
5 = local government
6 = multiple organizational types; i.e., the "treatment group" includes multiple programs which encompass more than one type of operating organization
7 = other (specify on coding sheet)

This item refers to the educational component of the treatment not to health or other human services which could be provided by a separate organization.

(16) Community (1 = urban/suburban, 2 = rural, 3 = combined) (three digits)

Coding convention:
Code the type of community served by the studied treatment. Code 3 if the treatment group comes from programs serving both urban/suburban and rural communities.

(17) Region (HHS region codes) (three digits)

Coding convention:
1 = CT, ME, MA, NH, RI, VT
2 = NJ, NY, Puerto Rico, Virgin Islands
3 = DE, DC, MD, PA, VA, WV
4 = AL, FL, GA, KY, MS, NC, SC, TN
5 = IL, IN, MI, MN, OH, WI
6 = AR, LA, NM, OK, TX
7 = IA, KS, MO, NE
8 = CO, MT, ND, SD, UT, WY
9 = AZ, CA, Guam, HI, NV, Pacific Trust Territories, American Samoa
10 = AK, ID, OR, WA
11 = Indian
12 = migrant
13 = multiple regions

(18) Sample comes from (1 = ssl, 2 = state, 3 = reg, 4 = nat) (three digits)

Coding convention:
1 = substate locality
2 = programs throughout a single state
3 = programs throughout a two-or-more state region
4 = programs throughout the nation

CHILD TREATMENT

(19) Center- or home-based predominant treatment

Coding convention:
1 = center-based
2 = home-based
3 = both

(20) Type of curriculum used (three digits)

Coding convention:
01 = Bank street humanistic model
02 = Weikart cognitive model
03 = Bereiter-Engelman; Engelman-Becker academically oriented model
04 = Enabler humanistic model
05 = new nursery school responsive model
06 = open education (English infant schools; pragmatic action-oriented)
07 = Bushell behavior analysis model
08 = bilingual
09 = DARCEE
10 = Montessori
11 = regular/traditional
12 = general behavioristic
13 = general cognitive
14 = general humanstic
15 = general experimental
16 = multiple forms of curriculum
17 = other (specify on coding sheet)
18 = special curriculum or experimental treatment

(21) Average number of days per week children received predominant treatment (Not applicable if home-based. If home-based and center-based combined, record combined duration for center-based component only.)

(0 _._)

(22) Average number of hours per day children received Head Start

(_ _ _)

Coding convention:
Code actual number of hours of treatment per day when available (directly or through computation). If schedule varies (e.g., 3 hours M, W, F and 4 hours T), record the average hours per day (in this example, 13/4 = 3.2 = 03). If home-based and center-based combined, record combined duration.

(23) Were hours per day estimated or reported in study? (three digits)

1 = reported
2 = estimated

(24) Average number of months per year children received predominant treatment

(_ _._)

(25) Were months per year estimated or reported? (three digits)

1 = reported
2 = estimated

(26) Total number of hours children received predominant treatment

(_ _ _)

(27) Were hours estimated or reported? (three digits)

1 = reported
2 = estimated

(28) Average total number of months children received predominant treatment

(_ _._)

Coding convention:
Record total number of months, not months per year as above.

(29) Were months estimated or reported? (three digits)

1 = reported
2 = estimated

(30) Total number of years children received predominant treatment

(0 _._)

Coding convention:
A year is defined as an operating school year.

(31) Average number of children per classroom or instructional group

(_ _ _)

Coding convention:
Not applicable for home-based programs. Note on coding format how number was arrived at.

(32) Average number of child/instructional staff ratio

(_ _ _)

Coding convention:
By "# instructional staff" we mean those generally in the classroom or instructional group while it is in session. Not applicable for home-based programs.

(33) Card number precoded.

(34) Study ID.

(35) Comparison number.

(36) Average number of child/adult classroom ratio

(_ _ _)

Coding convention:
This includes instructional staff and Head Start volunteers and parents.

(37) Average number of teachers per classroom

(_ _ _)

Coding convention:
Note how number was arrived at on coding sheet.

(38) Average number of adults per classroom

(_ _ _)

Coding convention:
Note how number was arrived at on coding sheet.

(39) Percent of all predominant treatment instructional staff with CDA credential

(_ _ _)

(40) Percent of all predominant treatment instructional staff who are certified teachers (e.g., state certification or nondegree certificate)

(_ _ _)

(41) Percent of all predominant treatment instructional staff who have a degree in early childhood education

(_ _ _)

Coding convention:
This includes associate as well as B.S. or higher degrees. Not all with such degrees need be certified, and not all the certified teachers need have degrees in early childhood education.

(42) Percent predominant treatment instructional staff who are minority

(_ _ _)

Coding convention:
If necessary, use data on all program staff as a surrogate.

(43) Average number of home visits per family per operating year

(_ _ _)

(44) Frequency of home visits (three digits)

1 = weekly
2 = biweekly
3 = monthly
4 = other (specify on coding sheet) or "many"

(45) Cost per child of predominant treatment (five digits)

Coding convention:
This item refers to total unit cost (i.e., direct service cost + administration/overhead cost). If necessary, calculate by dividing total cost by number of children in treatment program. Round to nearest dollar.

SUPPLEMENTAL SERVICES

(46) Special health services supplemental to regular Head Start services; i.e., an experimental program (three digits)

1 = yes
2 = no

(47) Special staff training supplemental to regular Head Start services (three digits)

1 = yes
2 = no

(48) Parent treatment (three digits)

Coding convention:
1 = yes, at least 50% of the children had at least one parent who received some type of treatment other than home-based treatment.
2 = no

(49) Focus of parent treatment (three digits)

Coding convention:
1 = parenting skills
2 = general education and/or skill training
3 = training parents to be Head Start classroom staff
4 = other (specify on coding sheet)
998 = if item 48 = 2

(50) Number of parent training sessions per year (three digits)

(_ _ _)

Coding convention:
998 = if item 48 = 2

SUBJECT CHARACTERISTICS

(51) Median or mean age of children (on initiation of treatment; in years rounded to one decimal place) (three digits)

(0 _._)

Coding convention:
Convert months to decimal places as follows:

months	years
1	.1
2	.2
3	.3
4	.3
5	.4
6	.5
7	.6
8	.7
9	.8
10	.8
11	.9

(52) Median or mean IQ of child (on initiation of treatment) (three digits)
Note: pretest IQ scores

(53) Name of IQ test (three digits)

Coding convention:
1 = Stanford-Binet Intelligence Test
2 = Peabody Picture Vocabulary Test
3 = Other (specify ______________________________)

(54) Card Number - precoded

(55) Study ID

(56) Comparison number

(57) Percent Minority

(_ _ _)

(58) Percent male

(_ _ _)

(59) Median or mean years of schooling completed by mother (upon initiation of treatment; high school = 12 years) (three digits)

(0 _ _)

Coding convention:
If only father's or parent's years of schooling provided, record this number and make a note on the coding format of the substitution.

(60) Median or mean number of people in the family or household

(0 _ _)

(61) Median or mean number of children in family or household (persons under the age of 19)

(0 _ _)

(62) Percent from one-parent households

(_ _ _)

(63) Reported general description of average SES (1 = low, 2 = middle) (Head start always = 1) (three digits)

(64) Percent from families with at least one parent in household employed (upon initiation of treatment)

(_ _ _)

Coding convention:
If document reports only % of families where no parent works more than 10 hours per week, multiply that value by ____ and code it here. If it reports only % of families where no parent works more than 15 hours per week, multiply that value by ____ and code it here.

(65) Percent from families where both parents employed

(_ _ _)

STUDY DESIGN

(66) Sampling procedure (three digits)

Coding convention:
Ignoring how subjects were assigned to G1 or G2, how were the subjects selected to be part of the sample?

1 = statistical sample
2 = convenience sample

(67) Assignment to groups (three digits)

Coding convention:
1 = no assignment (i.e., group is pre/post)
2 - random
3 = matching (on more than one variable)
4 = convenience

(68) Regression effects bias

Coding convention:
1 = Not plausible threat to internal validity
2 = Potential minor problem in attributing the observed effect to treatment; by itself, not likely to account for substantial amount of the observed results
3 = Very plausible alternative explanation which could account for substantial amount of the observed results
4 = Very plausible alternative explanation which by itself could explain most or all of the observed results

Statistical Regression is the inevitable tendency of persons whose scores are extreme (high above or far below the mean) on Measurement A to be less extreme (less high above or less far below the mean) on Measurement B. This phenomenon of regression toward the "mean" will be observed whenever Measurements A and B are not perfectly correlated, which for all practical purposes is always. For example, this will be a threat if children G1 were selected on the basis of an extreme score which was used simulataenously as a pretest and there was not a G2 or the G2 was not selected on the basis of the same extreme scores. For single group designs (pre/post), if the group was selected because it deviated from the mean on the pretest, there is likely to be major regression bias.

(69) Selection bias

Coding conventions:

1 = Not plausible threat to internal validity
2 = Potential minor problem in attributing the observed effect to treatment; by itself, not likely to account for substantial amount of the observed results
3 = Very plausible alternative explanation which could account for substantial amount of the observed results
4 = Very plausible alternative explanation which by itself could explain most or all of the observed results

Selection Bias occurs when subjects in G1 and G2 were selected on different bases. Definition: All of those factors which conspire to make G1 and G2 unequal at the outset of an experiment in ways which cannot be properly taken into account in the analysis of the data. For example, selection might invalidate a comparison of curriculum A with B if older, more experienced teachers were selected to teach the more difficult curriculum. It appears that in almost all instances the only feasible way to completely guard against selection bias is by employing the random assignment of persons or classrooms to treatments and then using statistical analyses of the final data which are based on the randomization procedure. Quasi-experimental designs will almost always have some selection bias. A selection bias favoring G1 is one where subjects were selected for it (or selected themselves for it) in a manner such that they could be expected to score higher on the posttest than G2 even if there is no treatment effect.

(70) Attrition bias

Coding conventions:

1 = Not plausible threat to internal validity
2 = Potential minor problem in attributing the observed effect to treatment; by itself, not likely to account for substantial amount of the observed results
3 = Very plausible alternative explanation which could account for substantial amount of the observed results
4 = Very plausible alternative explanation which by itself could explain most or all of the observed results

Experimental Mortality is the differential loss or "dropping out" of persons from two or more groups being compared in an experiment. If attrition is greater under curriculum A than curriculum B, a comparison of A and B at the end of one school year might be biased in that the students completing A would be brighter, on the average, than those completing B. This is true simply because the slower students were fatalities under curriculum A.

(71) Testing bias

Coding convention:

1 = Not plausible threat to internal validity

2 = Potential minor problem in attributing the observed effect to treatment; by itself, not likely to account for substantial amount of the observed results

3 = Very plausible alternative explanation which could account for substantial amount of the observed results

4 = Very plausible alternative explanation which, by itself, could explain most or all of the observed results

The effects of taking a test may affect the outcomes of subsequent administration of the same or a highly related test. Taking some cognitive ability tests may increase your score by several points on a second administration of the same test or a parallel form of it. For example this would be a threat if children were tested repeatedly with the same test instrument and no control group was included in the design.

(72) Instrumentation bias

Coding convention:

1 = Not plausible threat to internal validity

2 = Potential minor problem in attributing the observed effect to treatment; by itself, not likely to account for substantial amount of the observed results

3 = Very plausible alternative explanation which could account for substantial amount of the observed results

4 = Very plausible alternative explanation which by itself could explain most or all of the observed results

Changes in the instruments (tests, judges, etc.) may produce changes on the scores over time which are mistaken as treatment effects and produce instrumentation bias. For example, judges observing and rating some performance may be more lenient from time 1 to time 2.

(73) Overall index of quality of study (1 = lowest quality, 5 = highest)

Coding convention:
Use the chart on the following page as a rough guide, but use your best judgment.

GENERAL INDEX OF VALIDITY

RATINGS: 5	4	3	2	1
• well executed true experimental designs	• true experimental designs with minor problems • well executed quasi experimental designs	• quasi experimental designs with minor problems • well executed pre post designs • true experimental with moderate problems	• pre post designs with minor to moderate problems • quasi experimental with moderate problems • true experimental with major problems	• any quasi experimental design with major problems • pre post designs with major problems

(74) Total number of outcomes (three digits)

(75) Card Number

Coding convention:
This item is precoded.

OUTCOMES

(76) Study ID

(77) Comparison number (two digits)

(78) Outcome number (three digits)

(79) Sample size (five digits)

Coding convention:
Record the number (N) on which the effect size is based

(80) Effect size (ES)

(four digits: (± _._ _)

Coding convention:
Express as positive or negative
If you arrive at an ES above "2," recalculate

When there are data available allowing you to compute an ES in more than one way, compute it using the data with the lowest code for Item 81, "Data from which ES was calculated." Check with Harriet if covariance adjusted means are provided.

The following formulae are listed in order of preference, according to Item 81.

When "0.5" - round up.

If multiple measures of the same domain are recorded, the following conventions should be followed. If subscales for the same domain are reported, aggregate it into one score, or use the total score if reported. The general rule is to aggregate to the most specific domain. For example, if the California Achievement Test was used:

- If only total score is reported, record a single effect size under "general achievement"

- If math and reading subscales are reported, record two effect sizes, one under math achievement and one under reading achievement

- Do not record a total score and the subscale scores.

To aggregate subscale scores, calculate effect sizes for subscales and average. If different standardized tests of the same domain are used, code all tests for which effect sizes can be calculated (e.g., if two standardized IQ tests were administered and reported, code both test results). If a standardized and nonstandardized test are used, code only the standardized test. If data have been reanalyzed and different results reported, check with Karl about which results to code. This last possibility will occur most frequently when a secondary analysis has been conducted. Only measures of cognitive or family outcomes are to be coded.

(1) Age normed scores.

This option is appropriate when recording effect sizes for a pre/post comparison.

$$\frac{\text{Study Posttest score} - \text{normed } \overline{X} \text{ at age of posttest}}{\text{normed Sd at age of posttest}} - \frac{\text{pretest score} - \text{Normed } \overline{X} \text{ at age of pretest}}{\text{normed Sd at age of pretest}}$$

A list of national norms and standard deviations will be provided and attached to your manual. When using normed test scores, if your age range doesn't match normed test ranges, interpolate.

(2), (4) a) General convention.

$$\frac{\overline{X}_1 - \overline{X}_2}{Sd_2}$$

$\overline{X}_1$ = mean/group 1 (HS or posttest)

$\overline{X}_2$ = mean/group 2 (no treatment or pretest)

Sd= standard deviation/group 2

b) When to use gain scores.

When the comparison is Head Start vs. no treatment and pre- and posttest scores are recorded for G1 and G2 you should use gain scores rather than the general convention above if: (1) the pretest scores for G1 and G2 are very different, or (2) G1 and G2 are very different (e.g., lower class HS vs. middle-class control). Note: Do not use gain scores when recording a pre/post comparison; use age normed scores, if possible, or the general convention above.

(3)

$$\frac{\bar{X}_1 - \bar{X}_2}{Sd_{pooled}}$$

This will be used when the article only provides the pooled standard deviation.

(5) t ratio

$$ES = t\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

F ratio

$$ES = 2\sqrt{\frac{F}{n_1 + n_2}}$$

(6) t ratio from matched pairs

$$ES = t_d\sqrt{\frac{2}{n}(1-r_{xy}^2)}$$

See Harriet regarding how to figure r_{xy}

x = dep.
y = covariate

F ratio from repeated measures

$$ES = 2\sqrt{\frac{F}{n_1 + n_2}}$$

FOR ANY OTHER TYPES OF DATA (i.e., ITEMS 7-13 ON VARIABLE 104) SEE HARRIET FOR INSTRUCTIONS

(7), (8) Convert the probability level to a t statistic then use (3). Check with Harriet because there are problems with "p."

(9), (10) The n-way ANOVA can be collapsed to a one-way ANOVA then proceed as with (5). See Harriet for procedure.

(11) See Harriet.

(12) We may not compute ES for these so see Harriet for decision.

(13) If only a Chi square and no marginal data are given, an ES cannot be computed. See Harriet for final decision.

(14) See Harriet.

(81) Data from which ES was calculated

Coding convention:

1 = Nationally normed test national means and Sd provided. This formula is applicable only for one group pre/post designs.

2 = Means and G2 Sd - Article gave means for G1 and G2 and a standard deviation for G2 from which ES was calculated.

3 = Means and pooled Sd - Article gave means for G1 and G2 and a pooled standard deviation from which the ES was calculated.

4 = Means and published Sd - Article gave means for G1 and G2 and the Sd from Studies Standardizing the outcome test or Sd identified on list of tests.

5 = t ratio or/F ratio from one-way ANCOVA - Article gave a t or F for one way ANOVA, from which ES was calculated.

6 = t ratio from matched pairs t test or F ratio from repeated measures or other complex ANOVA design.

7 = Nonparametric test statistic except the chi squared.

8 = Probability estimate for t test or one-way ANOVA - Article gave a p-value from which a t or F was calculated and then the ES.

9 = Source of variance estimate for n-way ANOVA - Article gave a source of variance table for n-way ANOVA from which ES was calculated.

10 = Source of variance table from ANOVA, repeated measures, etc.

11 = Regression lines

12 = Proportions

13 = Chi square (only if a cross tab table and marginals provided)

14 = Other (specify on coding sheet)

(82) Scale of mean difference.

Coding convention:
Code only if Item 104 1, 2, 3, or 4; otherwise code as other.

1 = Final status measure - Raw or standard scores were used to calculate means.

2 = Raw gain score - Difference between pretest and posttest scores were used to calculate means.

3 = Residual gain score - Pretest and posttest scores were correlated, the correlation was used to predict posttest score from pretest score, and the difference between the predicted and obtained posttest scores were used to calculate means.

4 = Covariance adjusted scores = Outcome scores were correlated with scores on a covariate and adjusted to represent the outcome scores that would have been obtained if all subjects had obtained the same score on the covariate.

5 = other

(83) Domain of outcome

Coding convention:
01 = IQ/problem solving
02 = reading readiness
03 = math readiness
04 = general school readiness
05 = reading achievement
06 = math achievement
07 = language achievement
08 = general school achievement
09 = concept formation (like Piagetian tasks)
10 = grade retention
11 = special/remedial education placements
12 = other (specify on coding sheet)

See list of tests on next page.

NAME OF TEST	TYPE OF TEST	OUTCOME DOMAIN
Stanford-Binet Intelligence Scale	IQ	01
Peabody Picture Vocabulary Test	IQ	01
Metropolitan Readiness Test	School Readiness	04
Developmental Test of Visual Perception		
Illinois Test of Psycholinguistic Abilities	Language Achievement	07
Detroit Tests of Learning Aptitude (motor speed and precision test and visual attention for objects)		
Letter Recognition (identifying typewriter letters)	Reading Readiness	02
Merrill-Palmer Scale of Mental Tests	IQ	
Pictorial Test of Intelligence	IQ	01
Wechsler Preschool and Primary Scale of Intelligence	IQ	01
Vineland Social Maturity Scale	IQ	
Basic Concept Inventory	School Readiness	04
Cooperative Preschool Inventory	School Readiness	04
Stanford Primary Level Achievement Test	Achievement	08
Ravens Coloured Progressive Matrices	IQ (Problem Solving)	01
Basic Concept Inventory	Concept Formation	09
Eight Block Sorting Test	Concept Formation	09
Picture Story Language Test	Concept Formation	09
Wide Range Achievement Test	Achievement	08
Caldwell Preschool Inventory	School Readiness	04
Metropolitan Achievement Test-Primer	Reading/Math Achievement (listening for sounds)	08
Learning Accomplishment Profile		
Metropolitan Achievement Test-Primary I, II, Elementary	Achievement	08
Denver Developmental	Language	07

(84) Method of measurement

Coding convention:
1 = standardized test
2 = teacher- or research-made test
3 = scores based on systematic observation
4 = grades, grade retention, special placements

(85) Who administered outcome measurement?

Coding convention:
1 = person providing part or all of treatment
2 = post treatment school personnel
3 = outside researchers or evaluators.
4 = multiple -- some combination of above.

(86) Subsequent treatment (three digits)

Coding convention:
1 = Follow-through
2 = Elementary school without Follow-through
3 = Mixed Follow-through and non-Follow-through
4 = Elementary school with no mention of Follow-through
5 = none

Subsequent treatment is one administered after a predominant treatment but prior to the posttest. Note that if there is more than one posttest (i.e., longitudinal), then there will be more than one pre/post comparison.

(87) Type of special curriculum or experimental treatment (3)

Coding convention:
1 = Curriculum treatment-short (less than 4 months/1 hour day)
2 = Curriculum treatment-long (more than 4 months/1 hour day)
3 = Parent treatment-special
4 = Staff training
5 = Other. Specify

(88) Average number of weeks between start of program and administration of the pretest. (_ _)

(89) Number of months between completion of treatment and administration of post-measurement of outcomes. (± _ _ _) (Express as positive or negative.)

(90) Average number of months between administration of pretest and posttest

(_ _ _)

(91) Card Number

HEAD START EVALUATION
COGNITIVE OUTCOMES

Meta-Analysis Coding Instrument

DOCUMENT IDENTIFICATION

Author(s) ______________________________

Title ______________________________

1-4						1. STUDY ID (4)
5						2. TYPE OF DOCUMENT (1): 1-journal, 2=book, 3=thesis, 4=government or contractor publication, 5=unpubl., 6=multiple
6-8						3. DATE OF STUDY (2 digit)
9-10						4. CODER ID (2 digit)
11-12						5. TOTAL NUMBER OF COMPARISONS CODED (2 digit)
13-14						6. NUMBER OF COMPARISONS: HS vs. NON-HS (2)
15-16						7. NUMBER OF COMPARISONS: HS vs. HS (2)
17-76	BLANK					BLANK
77-80	0001					8. CARD NUMBER

1-4							9. STUDY ID (4)
5-6							10. COMPARISON NO. (2)
7							11. KIND OF COMPARISON (1) 1=HS pre/post, 2=HS vs no trt, 3=HS vs no indent. trt 4=HS exper. trt vs. HS control
8							12. TREATMENT--CHILD/PARENT (1) 1=Child only, 2=Child/parent separate, 3=Child/parent together
9							13. TYPE OF TREATMENT (1) 1=SHS, 2=NSHS, 3=SHS exp trt, 4=NHS exp trt, 5=HS not otherwise specified, 6=HS not otherwise specified exp trt, 7=Multiple, 8=Multiple exp trt.
10-12							14. NONSTANDARD HS (3) 1-Variations-center attend., 2=Homebased, 3=Locally designed, 4=Planned Variation, 5=Other
13-15							15. TYPE OF ORGANIZATION (3) 1=pub schl, 2=priv schl, 3=CAA, 4=nonprofit, 5=loc. gov't., 6=multiple, 7=other
16-18						G1	16. COMMUNITY (3) 1=Urb/sub, 2=Rur, 3=Comb
19-21						G2	
22-24						G1	17. HHS REGION (3)
25-27						G2	
28-30						G1	18. SAMPLE FROM (3) 1=ss, 2=state, 3=state/reg, 4=nat
1-33						G2	
							CHILD TREATMENT
34							19. CENTER/HOME BASED (1) 1=center, 2=home, 3=both

35-37							20. TYPE OF CURRICULUM (3)
38-40							21. DAYS PER WEEK (3) (0 _ _)
41-43							22. HOURS PER DAY (3) (_ _ _)
44-46							23. REPORTED? (3) 1=reported, 2=estimated
47-49							24. MONTHS PER YEAR (3) (_ _ _)
50-52							25. REPORTED? (3) 1=reported, 2=estimated
53-55							26. NUMBER OF HOURS--TOTAL (3)
56-58							27. REPORTED? (3) 1=reported, 2=estimated
59-61							28. TOTAL MONTHS (3) (_ _ _)
62-64							29. REPORTED? (3) 1=reported, 2=estimated
65-67							30. NUMBER YEARS (3) (0 _ _)
68-70							31. NUMBER OF CHILDREN PER CLASSROOM (3)
71-73							32. CHILD/STAFF RATIO (3)
74-76	BLANK						BLANK
77-80	0002						33. CARD NUMBER
1-4							34. STUDY ID (4)
5-6							35. COMPARISON NUMBER (2)
7-9							36. CHILD/ADULT RATIO (3)
10-12							37. NO. TEACHERS PER CLASSROOM (3)

13-15						38. NO. ADULTS PER CLASSROOM (3)
16-18						39. PERCENT STAFF/CDA (3)
19-21						40. PERCENT STAFF CERTIFIED (3)
22-24						41. PERCENT STAFF EARLY CHILD DEGREE (3)
25-27						42. PERCENT STAFF MINORITY (3)
28-30						43. NUMBER HOME VISITS (3)
31-33						44. FREQUENCY HOME VISITS (3) 1=weekly, 2=bimonthly, 3=monthly, 4=other
34-38						45. COST PER CHILD (5)

SUPPLEMENTAL SERVICES

39-41							46. HEALTH SERVICES (3) 1=yes, 2=no
42-44							47. STAFF TRAINING (3) 1=yes, 2=no
45-47							48. PARENT TREATMENT (3) 1=yes, 2=no
48-50							49. FOCUS OF PARENT TREATMENT (3) 1=prnt skills, 2=educ. or skill trng, 3=prnts as staff, 4=other
51-53							50. PARENT SESSIONS PER YEAR (3)
							SUBJECT CHARACTERISTICS
54-56						G1	51. AGE OF CHILD (3) (0 _ _)
57-59						G2	

60-62						G1	52. CHILD IQ (3)
63-65						G2	
66-68						G1	53. IQ TEST (3) 1=SB, 2=PPVT, 3=Other________
60-71						G2	
72-76	BLANK						BLANK
77-80	0003						54. CARD NUMBER
1-4							55. STUDY ID (4)
5-6							56. COMPARISON NO. (2)
7-9						G1	57. PERCENT MINORITY (3)
10-12						G2	
13-15						G1	58. PERCENT MALE (3)
16-18						G2	
19-21						G1	59. MOTHER YRS SCHOOLING (3)
22-24						G2	
25-27						G1	60. NO. PPL FAMILY (3)
28-30						G2	
31-33						G1	61. NO. CHILDREN IN FAMILY (3)
34-36						G2	
37-39						G1	62. PERCENT ONE PARENT (3)
40-42						G2	

43-45						G1	63. AVERAGE SES (3) 1=low, 2=middle
46-48						G2	
49-51						G1	64. PERCENT ONE PARENT EMPLOYED (3)
52-54						G2	
55-57						G1	65. PERCENT BOTH PARENTS EMPLOYED (3)
58-60						G2	

STUDY DESIGN

61-63						66. SAMPLING PROCEDURE (3) 1-statistical, 2=convenience
64-65						67. ASSIGNMENT TO GROUPS (3) 1=no assignment, 2=random, 3=match, 4=convenience
67						68. REGRESSION EFFECTS BIAS (1)
68						69. SELECTION BIAS (1)
69						70. ATTRITION BIAS (1)
70						71. TESTING BIAS (1)
71						72. INSTRUMENTATION BIAS (1)
72						73. OVERALL STUDY QUALITY (1)
73-75						74. TOTAL NUMBER OF OUTCOMES (3)
76	BLANK					BLANK
77-80	0004					75. CARD NUMBER

OUTCOMES

1-4		76. STUDY ID (4)
5-6		77. COMPARISON NO. (2)
7-9		78. OUTCOME NUMBER (3)
10-14	G1	79. SAMPLE SIZE (5)
15-19	G2	
20-23		80. EFFECT SIZE (4) ± (_ _ _ _)
24-25		81. DATA FR WH ES CALCULATED (2) 1=nat'l norms, 2=means-G2 sd, 3=means and pooled sd, 4=means and publ. sd, 5=+ or F ratio-one way 6=+-matched prs; F repeated measures, 7=non-par except chi sq., 8=prob. est., 9=source of variance-n-way ANOVA, 10=source of various repeated measures; 11=regression, 12=proportions, 13=chi sq., 14=other
26		82. SCALE OF MEAN DIFFERENCE (1) 1=final status measure, 2=raw gain store, 3=residual gain score, 4=covariance
27-28		83. DOMAIN OF OUTCOME (2) 1=IQ/prob. sol., 2=rdg readiness, 3=math readiness, 4=gen'l schl readiness, 5=rdg achvmt, 6=math achvmt, 7=lang achvmt, 8=gen'l schl 9=concept formation, 10=grade retention, 11=spec/rem plcmt 12=other

29						84. METHOD OF MEAS (1) 1=stand. test, 2=teacher/ research test, 3=outside research test, 4=multiple
30-32						85. WHO ADMINISTERED (3) 1=trtmt person, 2=post trtm person, 3=outside researchers, 4=multiple
33-35						86. SUBSEQUENT TREAT (3) 1=ft, 2=elem schl w/o ft, 3=elem and ft, 4=elem-no mention ft, 5=none
36-38						87. TYPE OF SP. CUR. OR EXP. TRT (3) 1=Cur. trt-spt., 2=Cur. trt-lg, 3=Par. trt-sp, 4=St. trg, 5=Other (specify)
39-41						88. WEEKS BETWEEN BEG OF TRT AND PRETEST (3) (_ _ _)
42-45						89. MONTHS BTWN TRT AND POSTTEST (4) (± _ _ _)
46-48						90. AVERAGE MONTHS BETWEEN PRE- (3) AND POSTTEST (_ _ _)
49-79	BLANK					BLANK
80-83						91. CARD NUMBER

APPENDIX E

LIST OF STUDIES

List of Studies

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APPENDIX F

SUPPLEMENTAL TABLES

Table A.1

Cognitive Gains During and After Head Start by Period of Head Start

	1965-1969 (n of effect sizes) [n of studies]	1970-1981 (n of effect sizes) [n of studies]
Gains Measured Before or at the End of Head Start	.39 (99) [18]	.70 (103) [18]
Gains Measured up to Three Years After Head Start	.13 (82) [13]	.43 (25) [7]

Table A.2

Cognitive Gains by Period of Head Start and Hours Per Day of Head Start

	1965-1969 (n of effect sizes) [n of studies]	1970-1981 (n of effect sizes) [n of studies]
Hours Per Day		
Up to 4	.31 (58) [11]	.56 (28) [6]
More than 4	.28 (52) [4]	.66 (44) [7]

Table A.3

Cognitive Gains by Period of Head Start and Months Per Year

	1965-1969 (n of effect sizes) [n of studies]	1970-1981 (n of effect sizes) [n of studies]
Months of Head Start Per Year		
Less than 8	.22 (14) [2]	.21 (11) [2]
8 or More	.25 (228) [31]	.76 (97) [21]

Table A.4

Cognitive Gains by Period of Head Start and Number of Children Per Class

	1965-1969 (n of effect sizes) [n of studies]	1970-1981 (n of effect sizes) [n of studies]
Average Number of Children Per Class		
13-15	.48 (31) [3]	.68 (31) [3]
16-18	.24 (38) [6]	.74 (29) [7]
19 or more	.24 (38) [3]	.84 (18) [6]

Table A.5

Cognitive Gains by Period of Head Start and Child/Staff Ratio

	1965-1969 (n of effect sizes) [n of studies]	1970-1981 (n of effect sizes) [n of studies]
Child/Staff Ratio		
8 to 1 or lower	.23 (52) [5]	* (8) [2]
Higher than 8 to 1	* (2) [2]	.68 (35) [5]

*Insufficient data for estimation

Table A.6

Cognitive Gains by Period of Head Start and Staff Training

	1965-1969 (n of effect sizes) [n of studies]	1970-1981 (n of effect sizes) [n of studies]
Percentage of Staff with Special Training		
0	* (3) [2]	.69 (24) [1]
Up to 50%	* (4) [1]	.73 (30) [2]
50% or more	* (7) [3]	.56 (14) [4]

*Insufficient data for estimation

Table A.7

Cognitive Gains by Period of Head Start and Type of Curriculum

	1965-1969 (n of effect sizes) [n of studies]	1970-1981 (n of effect sizes) [n of studies]
Type of Curriculum**		
Behavioristic/Cognitive	.34 (55) [7]	* (3) [2]
Self-Discovery	.26 (42) [3]	.77 (34) [7]
Traditional	.27 (34) [9]	* (7) [3]

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*Insufficient data for estimation

**The behavioristic/cognitive curricula consist of general cognitive, Bereiter-Englemann or Englemann-Becker models. The self-discovery curricula consist of new nursery school responsive model, DARCEE, Montessori and general experimental models.

Table A.8

Cognitive Gains by Period of Head Start and Program Operater

	1965-1969 (n of effect sizes) [n of studies]	1970-1981 (n of effect sizes) [n of studies]
Program Operator		
Public School	.24	.63
	(140)	(41)
	[17]	[12]
CAA	-.02	.81
	(35)	(30)
	[5]	[3]
Other	.33	.19
	(13)	(12)
	[4]	[2]
Multiple	.27	.49
	(67)	(69)
	[10]	[8]

*Insufficient data for estimation

Table A.9

Cognitive Gains by Type of Comparison and Area of Competency

	Pre/Post (n of effect sizes) [n of studies]	Head Start/ Head Start/ **No Treatment** (n of effect sizes) [n of studies]	Experimental Head Start/ **Head Start** (n of effect sizes) [n of studies]
Cognitive Domain			
Basic Competency	.52	.23	.28
	(96)	(65)	(18)
	[35]	[20]	[5]
Readiness	.77	.24	.11
	(75)	(48)	(14)
	[24]	[17]	[5]
Achievement	.50	-.09	*
	(40)	(67)	(7)
	[18]	[16]	[4]

Table A.10

Cognitive Gains by Type of Comparison During and After Head Start

	Pre/Post (n of effect sizes) [n of studies]	Head Start/ No Treatment (n of effect sizes) [n of studies]	Experimental Head Start/ Head Start (n of effect sizes) [n of studies]
Measured Before or At End of Head Start	.69 (127) [31]	.32 (49) [10]	.30 (26) [4]
Measured During First Three Years After Head Start	.77 (20) [9]	.08 (83) [16]	* (4) [1]

*Insufficient data for estimation

Table A.11

Cognitive Gains by Type of Comparison and Date of Head Start

Date of Head Start	Pre/Post (n of effect sizes) [n of studies]	Head Start/ No Treatment (n of effect sizes) [n of studies]	Experimental Head Start/ Head Start (n of effect sizes) [n of studies]
1965-1969	.45	.07	.19
	(113)	(136)	(37)
	[30]	[19]	[5]
1970-1972	.75	.18	*
	(73)	(47)	(5)
	[14]	[8]	[1]
1973-1981	.89	.01	
	(25)	(13)	(0)
	[7]	[7]	[0]

*Insufficient data for estimation

Table A.12

Cognitive Gains by Type of Comparison and Hours Per Day

Program Duration	Pre/Post (n of effect sizes) [n of studies]	Head Start/ No Treatment (n of effect sizes) [n of studies]	Experimental Head Start/ Head Start (n of effect sizes) [n of studies]
Part-Day	.60 (54) [15]	.04 (32) [6]	.19 (17) [3]
Full-Day	.55 (62) [8]	.36 (17) [5]	(0) [0]

Table A.13

Cognitive Gains by Type of Comparison and Months per Year of Head Start

	Pre/Post (n of effect sizes) [n of studies]	Head Start/ No Treatment (n of effect sizes) [n of studies]	Experimental Head Start/ Head Start (n of effect sizes) [n of studies]
Head Start Months per Year			
Less than 8	.33	*	
	(17)	(8)	(0)
	[4]	[2]	[0]
8 or More	.63	.15	.15
	(169)	(119)	(37)
	[39]	[21]	[4]

*Insufficient data for estimation

Table A.14

Cognitive Gains by Type of Comparison and Average Number of Children per Class

Number of Children Per Classroom	Pre/Post (n of effect sizes) [n of studies]	Head Start/ No Treatment (n of effect sizes) [n of studies]	Experimental Head Start/ Head Start (n of effect sizes) [n of studies]
13-15	.67 (42) [4]	.73 (12) [3]	* (8) [1]
16-18	.77 (28) [9]	.13 (27) [5]	.46 (12) [1]
19 or More	.54 (38) [9]	* (1) [1]	.19 (17) [2]

*Insufficient data for estimation

Table A.15

Cognitive Gains by Type of Comparison and Child/Staff Ratio

Child/Staff Ratio	Pre/Post (n of effect sizes) [n of studies]	Head Start/ No Treatment (n of effect sizes) [n of studies]	Experimental Head Start/ Head Start (n of effect sizes) [n of studies]
8 to 1 or less	.51 (38) [5]	.42 (10) [2]	.07 (12) [1]
More than 8 to 1	.69 (34) [5]	* (3) [3]	(0) [0]

*Insufficient data for estimation

Table A.16

Cognitive Gains by Type of Comparison and Staff Training

Percent of Specially Trained Staff	Pre/Post (n of effect sizes) [n of studies]	Head Start/ No Treatment (n of effect sizes) [n of studies]	Experimental Head Start/ Head Start (n of effect sizes) [n of studies]
0	.66 (25) [2]	* (2) [1]	(0) [0]
Up to 50%	.87 (18) [2]	.52 (16) [2]	(0) [0]
50% or More	.60 (15) [5]	* (6) [3]	(0) [0]

*Insufficient data for estimation

Table A.20

Cognitive Gains by Type of Comparison and Type of Curriculum

Curriculum Type**	Pre/Post (n of effect sizes) [n of studies]	Head Start/ No Treatment (n of effect sizes) [n of studies]	Experimental Head Start/ Head Start (n of effect sizes) [n of studies]
Behavioristic/ Cognitive	.27 (19) [5]	.79 (14) [3]	.18 (25) [3]
Self-discovery	.58 (49) [9]	.53 (10) [2]	.19 (17) [2]
Traditional	.80 (26) [8]	-.19 (15) [6]	(0) [0]

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*Insufficient data for estimation

**The behavioristic/cognitive curricula consist of general cognitive, Bereiter-Englemann or Englemann-Becker models. The self-discovery curricula consist of new nursery school responsive model, DARCEE, Montessori and general experimental models.

APPENDIX G

STUDIES USED IN EXHIBITS

STUDIES USED IN EXHIBITS

EXHIBIT 3.1

Basic Competency: 2, 81, 97, 98, 105, 116, 146, 152, 256, 258, 280, 316, 317, 357, 425, 485, 486, 541, 542, 565, 606, 607, 610, 617, 618, 621, 720, 744-746, 748, 756, 805, 812, 876, 877, 961, 963, 964, 983-990, 999, 1008, 1013, 1087, 1102, 1139, 1165, 1168, 1197, 1217, 1223, 1238, 1247, 1253, 1260, 1262, 1302, 1303, 1313, 1330, 1334, 1350

Readiness: 2, 56, 70-77, 116, 152, 227, 256, 258, 357, 376, 425, 485, 486, 541, 542, 565, 580, 617, 621, 668, 671, 720, 744-746, 748, 756, 772, 786, 812, 903, 963, 983-990, 999, 1007, 1034, 1087, 1102, 1125, 1165, 1204, 1217, 1244, 1247, 1260, 1262, 1302, 1303, 1330, 1334, 1350, 1401

Achievement: 48, 86, 152, 227, 235, 376, 425, 485, 486, 541, 542, 617, 621, 668, 671, 735, 744-746, 748, 756, 782, 805, 812, 876, 877, 895, 939, 999, 1007, 1087, 1102, 1125, 1139, 1165, 1196, 1197, 1204, 1217, 1262, 1330, 1350, 1401

Exhibit 3.2

Basic Competency: 2, 81, 116, 146, 152, 256, 258, 280, 357, 425, 485, 486, 517, 541, 542, 565, 606, 607, 610, 617, 618, 621, 744-746, 748, 756, 812, 876, 877, 963, 983-990, 999, 1008, 1013, 1165, 1168, 1169, 1217, 1223, 1238, 1253, 1260, 1262, 1302, 1303, 1313, 1330, 1334, 1350

Readiness: 2, 56, 70-77, 116, 152, 227, 256, 258, 376, 425, 485, 486, 541, 542, 565, 621, 744-746, 748, 756, 786, 812, 903, 963, 983-990, 999, 1007, 1125, 1165, 1217, 1244, 1260, 1262, 1330, 1334, 1350, 1401

Achievement: 48, 86, 152, 227, 235, 376, 425, 485, 486, 541, 542, 621, 735, 744-746, 748, 756, 782, 876, 877, 895, 999, 1007, 1125, 1165, 1217, 1262, 1330, 1350, 1401

Exhibit 3.3

Up to Four Hours Per Day: 81, 97, 98. 116, 146, 256, 258, 357, 376, 565, 735, 772, 805, 812, 895, 1007, 1087, 1102, 1217, 1302, 1303

More than Four Hours Per Day: 425, 606, 607, 610, 617, 621, 983, 984, 985, 986, 987, 989, 990, 1165, 1180, 1253

Exhibit 3.4

Less Than Eight: 720, 1102, 1217, 1244

Eight or More: 2, 56, 70-77, 81, 105, 116, 146, 152, 227, 256, 258, 280, 316, 317, 357, 376, 541, 542, 565, 606, 607, 610, 617, 618, 621, 735, 744-746, 748, 756, 772, 782, 786, 805, 812, 876, 877, 895, 963, 983-990, 999, 1007, 1008, 1013, 1087, 1125, 1165, 1168, 1169, 1180, 1196, 1217, 1223, 1238, 1253, 1260, 1262, 1302, 1303, 1313, 1330, 1334, 1350, 1401

Exhibit 3.5

13-15: 376, 541, 542, 983-990, 1165, 1196, 1217, 1350

16-18: 70-77, 152, 357, 376, 621, 744-746, 748, 756, 895, 961, 963, 964, 983-990, 1139, 1180, 1244, 1262, 1302, 1303

19+: 146, 235, 425, 606, 607, 617, 746, 1013, 1087, 1260, 1262

Exhibit 3.6

Up to 8/1: 146, 617, 621, 782, 983-990, 1087, 1196

More than 8/1: 70-77, 235, 580, 606, 1125, 1165, 1223

Exhibit 3.7

0%: 895, 983, 1165

1-50%: 744-746, 756, 983-990, 1260, 1262

50-100%: 70-77, 152, 746, 748, 983-990, 1007, 1168, 1169, 1180, 1253

Exhibit 3.8

Parent Program: 235, 617, 1102

No Parent Program: 152, 607, 610, 617, 621, 744-746, 748, 756, 1087, 1102, 1244, 1253, 1260, 1262

Exhibit 3.9

Cognitive Experimental: 146, 541, 542, 610, 617, 621, 963, 983-990, 1007, 1013, 1196, 1330, 1350

Other Experimental: 97, 98, 152, 280, 425, 617, 621, 744-746, 748, 756, 983-990, 1260, 1262

Traditional: 81, 97, 98, 105, 541, 542, 580, 720, 735, 983-990, 999, 1087, 1244, 1253, 1350

Exhibit 3.10

10th Grade or Less: 105, 116, 152, 227, 668, 671, 744-746, 748, 756, 903, 983-990, 1262, 1401

11th Grade or More: 70-77, 357, 617, 618, 744, 745, 756, 1008, 1168, 1169, 1262, 1302, 1303

Exhibit 3.11

0-40%: 105, 357, 617, 618, 720, 782, 1008, 1302, 1303

41-60%: 617, 720, 903, 983-990, 1168, 1169

61-100%: 983-990, 1125

Exhibit 3.12

Five: 70-77, 668, 671, 744, 745, 756, 983-990, 1262

Six: 105, 152, 617, 744-746, 748, 756, 963, 983-990, 1008, 1262

Seven or More: 227, 617, 1401

Exhibit 3.13

Low: 81, 541, 542, 606, 744, 745, 756, 1087, 1165, 1253, 1262, 1350

Low Average: 70-77, 116, 152, 256, 258, 280, 316, 317, 357, 425, 517, 541, 542, 565, 606, 607, 617, 618, 720, 746, 748, 772, 805, 812, 963, 1102, 1165, 1168, 1169, 1217, 1302, 1303, 1313, 1330, 1334, 1350

Average: 86, 97, 98, 146, 610, 617, 621, 720, 746, 812, 876, 877, 983-990, 1008, 1013, 1102, 1165, 1217, 1260, 1262, 1313

Exhibit 3.14

26-89% Minority: 70-77, 105, 152, 227, 235, 357, 541, 542, 617, 720, 744-746, 748, 756, 786, 895, 903, 961, 964, 983-990, 999, 1196, 1260, 1262, 1302, 1303, 1350, 1401

90-100% Minority: 48, 81, 86, 97, 98, 227, 256, 258, 485, 486, 565, 617, 720, 782, 786, 963, 983-990, 1034, 1168, 1169, 1223, 1238, 1253, 1401

Exhibit 3.15

Up to 4.0: 485, 486, 1087, 1125, 1253, 1313

4.1-4.5: 2, 48, 70-77, 97, 98, 105, 116, 146, 256, 258, 280, 357, 565, 607, 617, 668, 671, 720, 805, 812, 961, 963, 964, 983-990, 999, 1013, 1087, 1102, 1125, 1168, 1169, 1196, 1217, 1223, 1302, 1303

4.6-5.0: 152, 280, 425, 720, 744-746, 748, 756, 876, 877, 895, 1139, 1165, 1247, 1262

5.1 or Older: 86, 235, 541, 542, 580, 606, 746, 782, 1007, 1125, 1180, 1260, 1262, 1330, 1334, 1350

Exhibit A.1

1-50: 2, 81, 86, 97, 98, 146, 227, 235, 256, 258, 280, 425, 485, 486, 517, 541, 542, 565, 580, 610, 617, 618, 621, 720, 786, 805, 812, 876, 877, 939, 961, 964, 983-990, 1034, 1165, 1180, 1196, 1204, 1217, 1223, 1238, 1247, 1253, 1271, 1313, 1330, 1350, 1401

51-100: 2, 48, 56, 116, 256, 258, 485, 486, 541, 542, 565, 668, 671, 735, 786, 939, 983-990, 1007, 1008, 1102, 1139, 1165, 1204, 1334, 1350

101-150: 105, 256, 258, 316, 317, 376, 541, 542, 565, 606, 782, 812, 963, 999, 1007, 1087, 1197, 1330, 1350, 1408

151 or More: 70-77, 152, 227, 357, 376, 485, 486, 607, 744-746, 748, 756, 772, 786, 895, 903, 999, 1013, 1087, 1125, 1168, 1169, 1244, 1260, 1262, 1302, 1303, 1401

Exhibit A.2

Pre/Post: 48, 56, 70-77, 81, 97, 98, 105, 116, 146, 152, 235, 256, 258, 280, 316, 317, 357, 376, 425, 517, 541, 542, 565, 606, 607, 617, 618, 621, 720, 744-746, 748, 756, 772, 786, 805, 812, 876, 877, 895, 903, 939, 961, 964, 1007, 1008, 1013, 1087, 1102, 1125, 1165, 1168, 1169, 1196, 1217, 1244, 1253, 1260, 1262, 1302, 1303, 1313, 1330, 1350

Head Start/No Treatment: 2, 56, 81, 86, 227, 256, 258, 376, 485, 486, 541, 542, 565, 580, 606, 610, 617, 621, 668, 671, 735, 744, 745, 756, 782, 876, 877, 939, 983-990, 999, 1034, 1102, 1139, 1180, 1197, 1204, 1217, 1223, 1238, 1247, 1253, 1262, 1271, 1334, 1350, 1401

Exper. Head Start/Reg. Head Start: 425, 541, 542, 617, 963, 1330, 1350

Exhibit A.3

Poor: 56, 70-77, 81, 97, 98, 105, 235, 256, 258, 280, 316, 317, 376, 425, 485, 486, 517, 541, 542, 565, 580, 606, 607, 610, 617, 618, 621, 720, 735, 746, 782, 786, 805, 812, 876, 895, 903, 939, 961, 963, 964, 1007, 1008, 1034, 1087, 1125, 1139, 1180, 1197, 1204, 1217, 1223, 1238, 1244, 1253, 1260, 1262, 1271, 1330, 1350

Good: 2, 48, 81, 86, 116, 146, 152, 227, 357, 425, 541, 542, 606, 668, 671, 744-746, 748, 756, 772, 876, 877, 983-990, 999, 1013, 1102, 1165, 1168, 1169, 1196, 1217, 1247, 1262, 1302, 1303, 1313, 1330, 1334, 1350, 1401